

# Exhibit 72

**IN RE JOHNSON & JOHNSON TALCUM POWDER PRODUCTS  
MARKETING, SALES PRACTICES, AND PRODUCTS LIABILITY  
LITIGATION  
MDL NO. 16-2738 (FLW) (LHG)**

**Shu-Chun Su**

2024-05-21

**Credentials**

My name is Shu-Chun Su. I have developed methods and published on issues related to the identification of asbestos by polarized light microscopy (PLM) throughout my more than forty-year career.

I was born in China. I majored in Geochemistry at the Department of Geology, Peking University, for my bachelor's, a six-year program mirroring science programs at Moscow University. My Optical Crystallography was a two-semester (40 weeks) course. So was Optical Mineralogy. These two courses are the foundations of identifying rock-forming minerals using PLM. American Geology departments teach these two subjects in several weeks, not as complete semester courses. I graduated from Peking University in 1964, and I worked as a geological engineer in the Geological Survey of Gansu Province of China for 14 years. My job was to identify rock and mineral samples collected by field geologists in the geological mapping of the Gansu Province using a Zeiss polarized light microscope. Serpentine asbestos (chrysotile) was a common mineral species among the field samples of ultramafic rocks in that area. I developed expertise in the identification of asbestos—and specifically chrysotile—during my work here.

In 1979, I attended the Institute of Geology, Chinese Academy of Science, for graduate studies and obtained my Master's Degree in Mineralogy in 1981. Then, I came to the United States to pursue my doctoral studies at Virginia Institute of Technology and State University under Professor Donald Bloss, the preeminent, world-renowned expert in optical crystallography. My doctoral thesis was the study of silicate minerals by light and electron microscopy and X-ray diffraction spectroscopy, which are the same techniques used to analyze asbestos. The identification of chrysotile and other asbestos minerals by light microscopy is something that I have been researching and publishing for more than forty years.

After obtaining my Ph.D. in geology in 1985, I did two years of postdoctoral research in the development of an automatic optical instrument for measuring minerals' refractive index invented by Professor Bloss. I went to work at the Research Center, Hercules Incorporated, a specialty chemical and aerospace company. I was the director of the Optical and Electron Microscopy Laboratory in Wilmington, Delaware. My job was to characterize materials produced and researched by the company using various optical and electron microscopy techniques. As part of this work, I characterized chrysotile and other types of asbestos by PLM.

In 1988, I was recruited to become a Technical Expert in the Bulk and Airborne Asbestos Programs by the National Voluntary Laboratory Accreditation Program (NVLAP) under the Department of Commerce, a government office regulating asbestos analysis laboratories. Since then, I've conducted approximately one thousand on-site audits of asbestos laboratories, mainly in the United States but also in Canada, Japan, and Korea. These audits assess the laboratories' managerial and

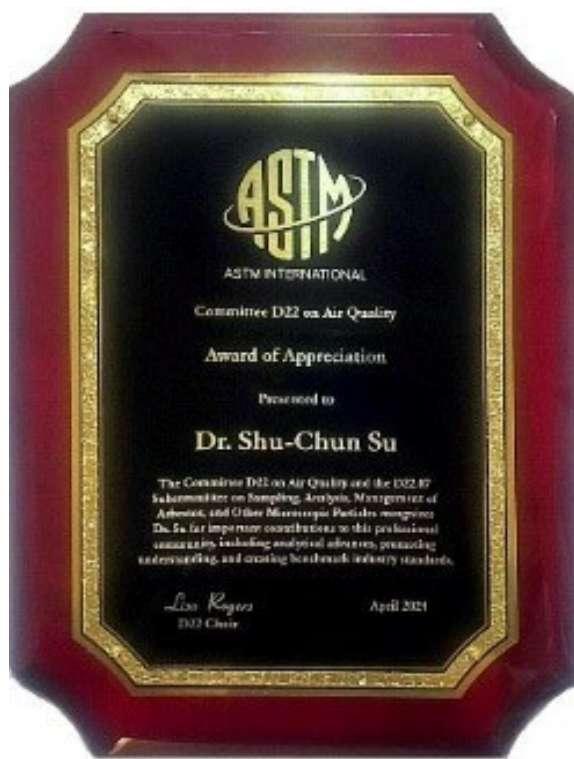
technical proficiency in conducting standardized PLM and TEM asbestos analyses. Every asbestos laboratory with (or seeking) NVLAP accreditation performs PLM asbestos analyses.

To date, I've authored 29 publications on asbestos analysis, which are identified in my biography, which is attached as **Exhibit A**.

In the area of airborne asbestos analysis, I have created 880 pages of comprehensive tables for the identification of amphibole asbestos, which has been widely used by airborne asbestos laboratories around the world.

My most well-known contribution to asbestos analysis is a standard operating procedure to quickly and accurately measure the refractive index (RI) of asbestos minerals (the primary diagnostic optical property of "fingerprinting" asbestos minerals) using the central stop dispersion staining technique by PLM. This procedure is accurate and highly efficient, reducing a lengthy ten-minute graphic solution of RI value into 10 seconds. This technique has been referred to as the "Su Method" by scientists practicing in this area and has been cited in textbooks addressing the identification of asbestos by PLM. The Su Method has been adopted by most analytical laboratories performing PLM analyses in the United States and overseas. In fact, Dr. William Longo's laboratory MAS reports that they themselves have been using my Su Method for Johnson's Baby Powder analyses.

In April 2024, at ASTM International's Michael Beard Conference on Asbestos Terminology, the organization presented me with an award recognizing my career-long contributions to asbestos analysis, including recognizing the "Su Method" as a significant achievement in PLM analytical procedures.



As noted above, I am an accomplished expert in the characterization of asbestos minerals by PLM. It has been a focus of my entire career. As such, I am uniquely qualified to assess whether or not a laboratory's PLM data identifying asbestos using my Su Method is reliable and accurate.

### **Scope of Analysis**

I have been asked to review PLM data put forth by Dr. Longo's laboratory MAS in which he claims to identify "chrysotile" in Johnson's Baby Powder by PLM using central stop dispersion staining. I am being compensated at a rate of \$800 per hour for my scientific analysis of this issue. I have not provided any deposition or trial testimony in the past four years.

A list of the MAS reports that I reviewed identifying "chrysotile" in Johnson's Baby Powder is identified in **Exhibit B**.

As I explain further below, I disagree with each and every single PLM identification of "chrysotile" in Johnson's Baby Powder made by Dr. Longo's laboratory in the reports that I have reviewed. The data presented by MAS demonstrate significant deficiencies in all areas, which leads me to conclude that the laboratory is incapable of performing the most fundamental aspects of PLM analysis or correctly identifying chrysotile by PLM. A summary of the analytical failings of MAS appears below and is expanded upon in the demonstrative materials that I have attached as **Exhibit C**. The bases for my opinions are my experience, education, training, my publications that are listed in **Exhibit A**, and the sources cited in this report and the attached **Exhibit C**.

### **Summary of Analysis**

Dr. Longo's laboratory's identification of "chrysotile" in Johnson's Baby Powder by PLM is incorrect and unreliable for the following reasons:

#### **1. MAS's Procedure for Measuring Refractive Index Values is Inaccurate and Unreliable**

##### **a. MAS Used Suppressed Light Intensity, Leading to Inaccurate and Unreliable Refractive Index Value Determination**

In order to accurately measure the RI value of a mineral by PLM, it is fundamental that the equipment used needs to be set appropriately. MAS routinely uses insufficient light intensity, as if the light intensity was suppressed, which in turn subdues the dispersion staining color, resulting in a subdued RI value and a subdued birefringence value. The result is that talc's high  $\gamma$  and the associated birefringence are suppressed, making the elongated talc particle look like chrysotile. If the light suppression is unintentional, then MAS has failed to conduct basic PLM procedures, such as adjusting the light intensity and aperture diaphragm to optimal condition to achieve a fully and adequately displayed dispersion staining color or accurately calibrating the objective lens so that it can measure particles size accurately (as I will discuss further below).

I describe examples of this problem on pages 2 through 5 of **Exhibit C**.



**b. Inaccurate Refractive Index Measurement Procedure Leads to Unreliable Results**

MAS routinely fails to accurately identify the RI value exhibited by particles in its PLM analyses. There are numerous instances of MAS assigning an RI value that is simply wrong (and incorrectly closer to values that may be associated with chrysotile rather than talc). Based on my review of the reports identified in **Exhibit B**, the data presented by MAS demonstrates a systematic failure to assign RI values correctly. I describe examples of this systematic problem on pages 6 through 11 of **Exhibit C**.

In addition, there are other instances in which a talc particle exhibits a distorted dispersion staining color due to the total reflection occurring at the liquid-solid interface that a proficient PLM analyst who understands the basic principles of the central stop dispersion staining technique would recognize as a common phenomenon. Instead, MAS used the distorted dispersion staining color for RI assignments, leading to incorrect RI value, which, in turn, led to the misidentification of talc particles as “chrysotile.” I describe examples of this problem on pages 12 through 14 of **Exhibit C**.

**c. Dr. Longo's Claim That Particle Sizes Change Refractive Index Values Is Wrong**

A mineral's RI is a constant governed by their chemical composition and crystal structure. MAS's theory that chrysotile's RI increases as the particle size decreases is unfounded and defies basic principles of physics. In fact, if such a theory is proved, it would shake the very foundation of physics.

The National Institute of Standards and Technology (NIST) Standard Reference Material (SRM) 1866 chrysotile RI values,  $\alpha$  1.549 and  $\gamma$  1.556, were measured by John Phelps, a scientist at NIST, on a single fiber using the spindle stage technique. I know these details because John Phelps was in communication with me during the measurements that became the published SRM reference values. The spindle stage technique was invented by Professor Donald Bloss, my Ph.D. supervisor. I am an expert in this technique and author of the computer program used in the spindle stage measurement procedure. The “chrysotile” fibers that MAS claims to identify in Johnson's Baby Powder by PLM cannot be any thinner than the NIST SRM 1866 single chrysotile fiber that serves as the data point for the certified RI values for this material. MAS's claim that the particle sizes of “chrysotile” it finds in PLM analyses of Johnson's Baby Powder are so unique is not only unfounded but also without the support of credible measurement data that directly refutes the claim. I describe this problem on pages 15 and 16 of **Exhibit C**.

Another critical fact is that certified NVLAP RI values of “Calidria” chrysotile—a unique form of chrysotile from California that MAS claims is similar to the “chrysotile” it finds by PLM in Johnson's Baby Powder—are  $\alpha$  1.555 and  $\gamma$  1.560, which are only 0.004 - 0.006 higher than the SRM 1866 chrysotile, documented by NVLAP in “ANALYSIS SUMMARY FOR NIST BULK ASBESTOS PROFICIENCY TESTING February 2001, Test Round M12001.” Again, MAS's claim that the particle sizes and RI values of the “chrysotile” it found in PLM analyses of Johnson's Baby Powder are a match for Calidria chrysotile are inaccurate and not supported by the data. I describe this problem on page 17 of **Exhibit C**.

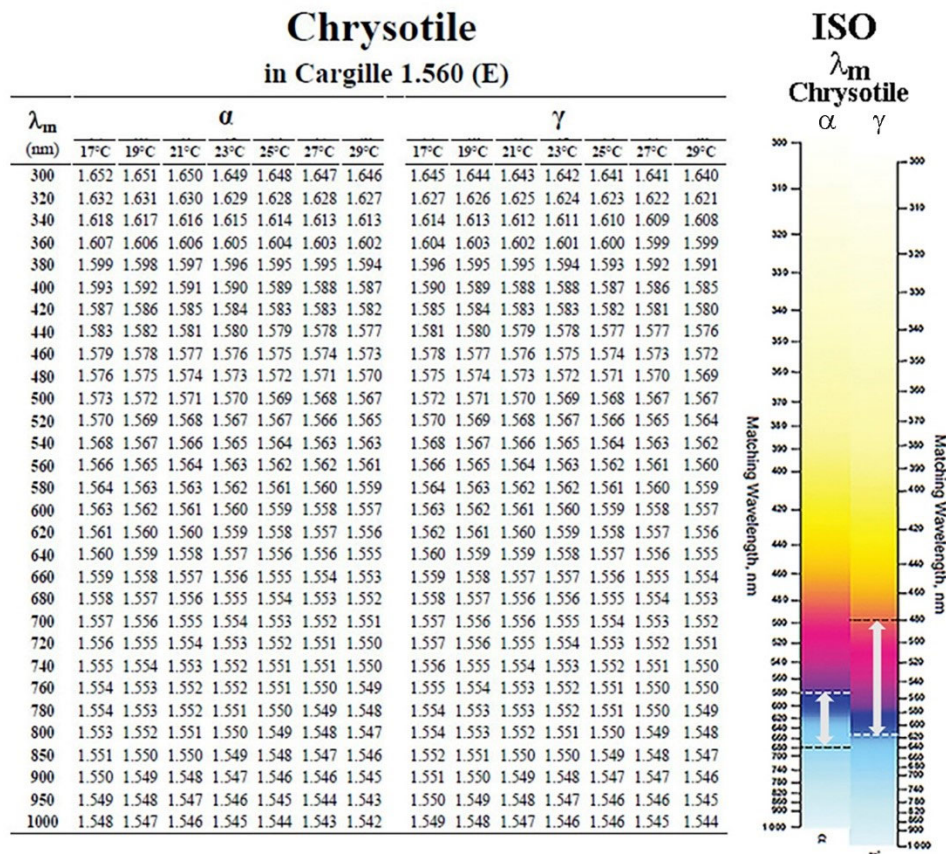
**d. MAS's Complete Misunderstanding of My Central Stop Dispersion Staining Color Conversion Tables Leads to Incorrect and Unreliable "Chrysotile" Identification**

I have created and published procedures and reference tables that help analysts measure RI values of the six regulated asbestos minerals, including chrysotile. MAS relies upon my procedure and tables as part of its PLM analyses of Johnson's Baby Powder.

However, Dr. Longo completely misunderstood my reference table and claimed that the RI range of my chrysotile table represents the chrysotile's minimum and maximum RI values. This is not true.

To illustrate, in the International Organization for Standardization (ISO) chart included in the 22262-1 method, the possible  $\alpha$  and  $\gamma$  RI ranges of chrysotile are only a small section (between the dotted lines in the following figure) of the dispersion staining color chart; the chart must cover the whole dispersion staining color spectrum, and the same is true of my conversion table. The ranges of the ISO chart and my table must be much wider than the RI range of chrysotile.

My table is the numerical version of the ISO graphic chart for people who understand the principle. For people who do not understand this basic principle of my procedure and tables, it is impossible to correctly perform the analytical procedure of RI measurement by dispersion staining technique.



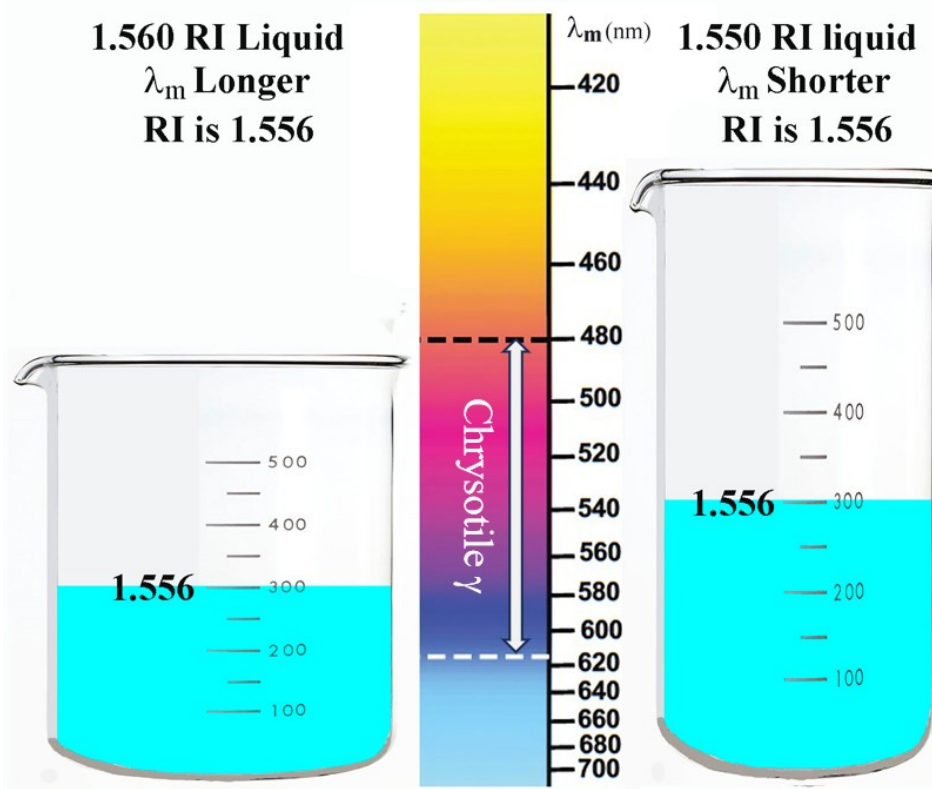
I describe this problem on pages 18 through 20 of **Exhibit C**.

**e. Dr. Longo's Understanding of the Refractive Index Liquid's Effect on Mineral's Refractive Index Values Is Wrong**

In 2022, I published a paper on the application of the dispersion staining technique to asbestos analysis. I recommended the use of 1.560 RI liquid for measuring the  $\gamma$  of Calidria chrysotile to improve the accuracy of measurement.

The only purpose of switching from 1.550 to 1.560 is to improve the accuracy of RI measurement because chrysotile's RI is a constant and does not change with the surrounding liquid medium.

**When the same mineral is measured in two different RI liquids, its RI remains the same, but the matching wavelength  $\lambda_m$  changes accordingly: the lower liquid produces a shorter  $\lambda_m$  and the higher liquid produces a longer  $\lambda_m$ .**



The above diagram shows two beakers; the left one is wider, representing 1.560 liquid, and the right one is thinner, representing 1.550 liquid. The volume of water represents the  $\gamma$  refractive index.

The 300 milliliters of water volume –  $\gamma$  value – does not change, but the water level –  $\lambda_m$  – changes from a shorter (upper) matching wavelength to a longer (lower) matching wavelength.

In 2022, Dr. Longo switched to 1.560 RI liquid. Without any background in optical crystallography, he mistakenly thought measuring in the 1.560 RI liquid would give his laboratory results different from those using 1.550 RI liquid. As noted below, MAS's use of the 1.560 RI liquid produced a suite of  $\alpha$  and  $\gamma$  values similar to the 1.550 RI liquid values, none of which establish the

presence of chrysotile.

**M71614-M71643-M71740 J&J Baby Powders**

Date	MAS No.			$\gamma$		$\alpha$	
				Low	High	Low	High
2023-02-28	M71614	001	1	1.564	1.564	1.561	1.561
			2	1.565	1.565	1.561	1.561
			3	1.568	1.568	1.557	1.560
			4	1.565	1.568	1.560	1.564
2023-10-19	M71643	001	1	1.566	1.566	1.561	1.561
			2	1.566	1.569	1.557	1.561
			3	1.561	1.561	1.552	1.552
			4	1.568	1.568	1.559	1.559
2024-02-15	M71740	001	1	1.564	1.564	1.560	1.560
			2	1.564	1.564	1.560	1.560
			3	1.565	1.565	1.562	1.562
			4	1.563	1.563	1.561	1.561
Average				1.565	1.565	1.559	1.560
Grand Average				1.565		1.560	

The above table summarizes 12 pairs of  $\alpha$  and  $\gamma$  values from 2023 (M71614 and M71643) and 2024 (M71740) reports.

**Three Types of Chrysotile**

Type	$\alpha$	$\gamma$	Birefringence	RI	Source
SRM 1866	1.549	1.556	0.007	Standard	NIST
Calidria	1.555	1.560	0.005	Significantly higher than 1866	NVLAP
New?	1.560*	1.565*	0.005	Significantly higher than Calidria	MAS

\* Average of 12 samples in M71614, M71643, and M71740.

When I used the term “significantly higher” to describe Calidria chrysotile as compared to NIST SRM 1866 chrysotile, the RI values were in the area of .006 to .004 higher as described above. MAS’s “chrysotile” is another “significantly higher” increase above Calidria chrysotile. Were those data credible (and they are not), MAS single-handedly discovered a new type of chrysotile, whose RI is significantly higher than the Calidria chrysotile as shown in the above table. Obviously, there has never been any report of the existence of such a unique type of chrysotile with such peculiar optical properties. MAS is simply wrong again.

I describe this problem on pages 21 and 22 of **Exhibit C**.



## 2. MAS's Procedure for Measuring Particle Sizes is Inaccurate and Unreliable

### a. Scale Bars Are Completely Inaccurate

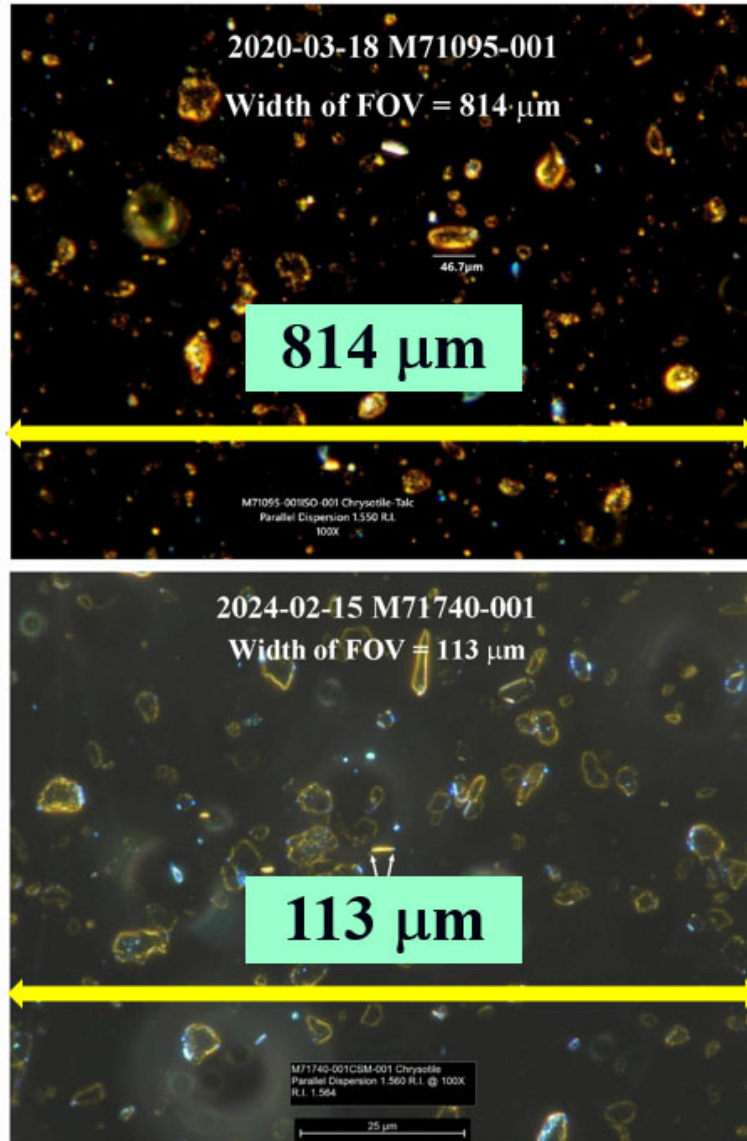
Mineral	Minimum (µm)	Average (µm)	Maximum (µm)	Reference
Talc	1.5	9.3	37.0	MAS (2017)
SG-210 Chrysotile	3.0	8.0	10.0	MAS (2023)

MAS reported the above talc particle size data from analyzing approximately 30 containers of Johnson & Johnson talcum powder products by SEM using image analysis software in 2017. The maximum particle size is 37 micrometers, which makes sense because the specification of Baby Powder is passing through a 325 mesh (44 micrometers) sieve.

Date	MAS No.	Chrysotile Length (µm)		
		Individual	Average	vs. Talc
2020-02-24 M70484	001-001	78.8	61.6	Same particle size range as talc
	001-002	33.3		
	001-003	38.5		
	001-004	71.3		
	001-005	62.2		
	001-006	57.0		
	001-007	70.4		
	001-008	49.6		
	002-001	58.5		
	002-002	78.5		
	002-003	79.3		
2020-03-18 M71095	001-001	46.7	32.2	Same particle size range as talc
	001-002	13.3		
	001-003	34.8		
	001-004	34.1		
2020-03-20 M70877	001-001	60.0	37.6	Same particle size range as talc
	001-002	25.9		
	001-003	23.0		
	001-004	41.5		
2021-05-25 M71228	001-001	105.2	55.2	Same particle size range as talc
	001-002	59.5		
	001-003	17.2		
	001-004	38.8		
2022-03-11 M71262	001-001	32.8	32.8	Same particle size range as talc
	001-002	21.6		
	001-003	26.7		
	001-004	50.0		
2023-03-28 M71614	001-001	6.0	4.9	Same particle size range as talc
	001-002	5.1		
	001-003	3.9		
	001-004	4.8		
2023-10-19 M71643	001-001	3.9	3.8	Same particle size range as talc
	001-002	6.6		
	001-003	2.2		
	001-004	2.7		
2024-02-15 M71740	001-001	3.6	8.5	Same particle size range as talc
	001-002	9.4		
	001-003	12.0		
	001-004	8.9		

The above table summarizes eight reports over the last five years. The dramatic variation of the “chrysotile” particle size, which is in the same size ranges as talc that can be seen in the PLM photomicrographs in each of the above reports, clearly indicates inaccurate scale bars, leading to inaccurate particle size measurements.

The creation of an accurate scale bar is a fundamental (and normally very easy) procedure of PLM. Over the years, MAS’s systematic failure to create accurate scale bars for their analyses of Johnson’s Baby Powder by PLM can only be attributed to the lack of basic expertise of MAS’s analysts.



The width of the field of view (FOV) can be calculated from the scale bar length or the width of an object in the image. In the March 18, 2020 report M71095, the 814  $\mu\text{m}$  field of view (FOV) width was wrong. Five years later, the mistake remained uncorrected. The February 15, 2024 report M71228 still reported a grossly wrong FOV width of 113  $\mu\text{m}$ . Regardless of the microscope’s make, Olympus

Nikon Leitz or Leica, the FOV width for a 10X objective lens is slightly over 1 mm or 1,000  $\mu\text{m}$ .

What is important is that the particle sizes in these two micrographs with drastically different FOV widths are the same. That is because they are taken at the same magnification but the scales reported by MAS are wrong.

The only conclusion is that MAS is not capable of correctly performing PLM's most fundamental operation procedure: measuring the sizes of particles that it is analyzing. On occasion, the particle sizes are incorrect by ten times or more.

I describe this problem on pages 23 through 25 of **Exhibit C**.

**b. If Chrysotile Was Truly Present In Johnson's Baby Powder, Its Particle Sizes Would Not Match Talc, as MAS Claims**

Although MAS fails to correctly measure particle size by PLM, the micrographs in every Johnson's Baby Powder analytical report document the undeniable fact that the particle size of the claimed "chrysotile" matches the particle size of the surrounding talc. If that were true, it means the chrysotile's particle size was reduced to the particle size range of talc particles during the milling process of Johnson's Baby Powder production.

Chrysotile is a mineral with a very high tensile strength, around 100,000 pounds per square inch. It is so strong that it used to be woven into fabrics for making heat protection gears used in steel mills. It is also a super anti-abrasion additive used to make automobile braking shoes.

On the other hand, talc is the softest mineral on Earth. It is easily breakable.

The two minerals have drastically different grinding behaviors. When ground together, talc is easily and quickly ground into fine powders, whereas chrysotile is reduced to a particle size of hundreds of micrometers, significantly larger than talc. This differential grinding effect has been confirmed by US Pharmacopeia (2022) and Pier (2017).

Therefore, the "chrysotile" particles within the particle size range of talc powders cannot be chrysotile. They are talc.

I describe this problem on pages 26 through 52 of **Exhibit C**.

**3. MAS's Procedure for Reporting Amounts of "Chrysotile" Identified in Johnson's Baby Powder is Inaccurate and Unreliable**

**a. Visually Estimated Percentages Are Inherently Unreliable**

EPA bulk asbestos analysis procedure requires a point counting procedure for the asbestos quantification. The visual estimate procedure cannot quantify asbestos concentration at 0.00x% level, let alone 0.000x% level. NVLAP requires calibrated visual estimates (CVEs) for quantifying asbestos by PLM at the 1% level. Even at the 1% level, CVEs are difficult and require visual reference charts of the type that I have published. Yet MAS claims that it is capable of performing visual estimates of "chrysotile" concentrations beyond one ten thousandth of a percent without so much as a visual



reference chart against which to compare. There is no scientific justification for this claim and certainly no methodology or validation establishing the accuracy of these visual estimates by MAS.

I describe this problem on pages 53 through 64 of **Exhibit C**.

**b. Fiber Per Gram Figures Based on Inappropriate Extrapolation from Unpublished Method with No Calculated Rate of Error**

Dr. Longo's unpublished "concentration" preparation technique leads to highly variable and inappropriate extrapolated quantitative results. As an example, in the February 28, 2023 Valadez Report, a sample size of 0.000017 grams was used to extrapolate to 1 gram of Baby Powder—58,824 times extrapolation. Given the 0.0003 to 0.0006% chrysotile concentration claimed, a lenient 0.5% maximum allowed error, and a sample size of 0.000017 grams, the calculated Confidence Level is less than 50%, making the False Positive error rate greater than 50%. Such an irresponsible and unheard-of False Positive error rate is totally unacceptable as part of an analytical methodology. A responsible laboratory will never adopt such a sampling scheme to make the False Positive error rate greater than 50%. And such a methodology could never pass scrutiny to become an accepted method by any standards setting organization.

I describe this problem on pages 65 through 75 of **Exhibit C**.

**4. MAS's Liquid Density Sample Preparation Procedures for "Chrysotile" are Inaccurate and Unreliable**

**2020 - 2024 HLS Results**

Date	MAS No.			Light Fraction %
2020-09-17	M71666	001	1	17.0
			2	14.6
			3	13.4
2021-05-25	M71216	001	1	24.2
			2	21.4
			3	21.3
2023-02-28	M71614	001	1	15.9
2023-10-19	M71643	001	1	19.7
2024-02-15	M71740	001	1	25.7

While I have reviewed all of the reports included in **Exhibit B**, the above table includes the weight recovery fractions reported by MAS in a handful of Johnson's Baby Powder products over a five-year span. This small group of samples is illustrative of the high degree of variation in the sample preparation procedure as well as the inability of MAS's sample preparation procedure to effectively concentrate the "chrysotile" that it claims to find in Johnson's Baby Powder.

As shown in the table above, from 2020 to 2024 over a five year span using various different sample preparation techniques as described in MAS's reports, the heavy liquid separation sample preparation procedure produced a series of extremely inconsistent light fractions ranging from 13.4% to 24.2% in talcum powder products, which further produced "chrysotile" concentrations ranging from 0.003% to 0.01%. For Baby Powder samples consisting of 99.9% talcum powder, which should be in the heavy fraction, how possible is the light fraction more than 1%? It is beyond comprehension that

those ridiculous two-digit light fraction results did not make MAS realize something was grossly wrong with each and every sample preparation procedure that it tried over the course of five years.

The extremely high degree of volatility in weight recovery is not only a result of the deficiency in MAS's sample preparation procedure but also a clear indication of the non-existence of chrysotile. There is no chrysotile to concentrate regardless of the heavy liquid density separation process used.

I describe this problem on pages 76 and 77 of **Exhibit C**.


## **Conclusion**

For the reasons stated above, I disagree with each and every single identification of "chrysotile" in Johnson's Baby Powder made by Dr. Longo's laboratory in the reports that I have reviewed. The data presented by MAS demonstrate systematic and chronic deficiencies in almost every aspect of operation, from the equipment setup and calibration to the sampling procedure, the sample preparation processes, the execution of the analytical procedure, and reporting quantification procedure, which leads me to conclude that the laboratory is incapable of performing the most basic aspects of PLM analytical procedure let alone correctly identifying chrysotile by PLM.

The following is a summary of MAS's systematic and chronic deficiencies:

- Inability to ensure a 95% Confidence Level of quantification.
- Inability to correctly interpret dispersion staining colors.
- Inability to calibrate dispersion staining colors.
- Inability to understand the relationship between the material's refractive index and the refractive index of liquids used for measurement.
- Inability to conduct calibrated visual estimate (CVE).
- Inability to check the internal consistency of analytical data.
- Inability to correctly measure particle size under a polarized light microscope.
- Inability to correctly create scale bars.
- Inability to understand the fundamental physics principles governing the relationship between a material's refractive index and physical dimension.
- Inability to understand the fundamental geological principles governing the formation of minerals and mineral ore deposits.

I hold all of the opinions that I expressed in this report and **Exhibit C** to a reasonable degree of scientific certainty.

  
By: \_\_\_\_\_  
Dr. Shu-Chun Su

Date: May 21, 2024

## Exhibit A – Biography

**National Voluntary Laboratory Accreditation Program  
National Institute of Standards and Technology  
Department of Commerce  
USA**

### ***Dr. Shu-Chun Su***

Shu-Chun Su became an NVLAP Technical Expert for the Bulk and Airborne Asbestos Programs in 1988. Since then, he has conducted close to a thousand NVLAP on-site assessments of bulk and airborne asbestos laboratories in the USA, Canada, Japan, and Korea.

### **Skills and Expertise**

Dr. Su is an accomplished expert in general and optical mineralogy, petrography, igneous and metamorphic petrology, geochemistry, crystal chemistry, powder and single crystal X-ray crystallography, digital image analysis, and various microscopy techniques, including polarized light microscopy, scanning electron microscopy, transmission electron microscopy, infra-red micro-spectroscopy, Raman micro-spectroscopy, confocal laser scanning microscopy, etc. Dr. Su's analytical approach to derive refractive indices at various wavelengths from dispersion staining data was recognized to be "Su's Method" by Professors R. E. Stoiber and S. A. Morse at Massachusetts University, Amherst, in "Crystal Identification with the Polarizing Microscope," Springer, 358pp, 1994. By applying this method to bulk asbestos analysis, he has developed a standardized procedure for rapidly and accurately determining refractive indices of asbestos fibers using the dispersion staining technique. The procedure has been used by more than 95% of asbestos laboratories in the USA, Canada, Japan, and Korea since 1994 and was formally published in 2003.

In the area of airborne asbestos analysis, Dr. Su has developed a computer program as well as detailed d-spacing and interfacial angle tables for the six regulated asbestos minerals plus winchite, richterite, and talc to assist the indexing and interpretation of zone-axis SAED (selected area electron diffraction) patterns. It's been widely used by airborne asbestos laboratories around the world.

### **Education, Work History, and Relevant Work Experience**

Dr. Su obtained a B.S. in Geochemistry from Peking University, China, in 1964 and worked in the Central Laboratory, Geological Survey of Gansu Province for 17 years. After earning an M.S. in Mineralogy at the Institute of Geology and Geophysics, Chinese Academy of Sciences in 1981, Dr. Su came to the U.S. to pursue graduate study in crystal chemistry, optical crystallography, and silicate mineralogy with Professors F. Donald Bloss and Paul H. Ribbe at Virginia Polytechnic Institute and State University. After completing his Ph.D. in Geology/Mineralogy in 1985, he did post-doctoral research to develop an automated refractometer and joined Hercules Incorporated in 1987. Before his retirement in 2006, he was a Senior Research Scientist and Director of the Light and Electron Microscopy Laboratory at Hercules Research Center, Wilmington, Delaware. He is a Fellow of the Mineralogical Society of America.

Rev. 2024-02-22

### **29 Publications Relevant To Asbestos Analysis**

2024 Su, S.C. The Unification of Becke Line and Dispersion Staining Techniques For the Determination of Refractive Index of Non-Opaque Materials. *The Microscope*. 70:3, 99–112.  
<https://doi.org/10.59082/XCLR4173>

- 2023 Su, S.C. The Calibration of Dispersion Staining Colors. *The Microscope*, 70:1, 3-21. <https://doi.org/10.59082/HNQR9171>
- 2022 Su, S.C. The Dispersion Staining Technique and Its Application to Measuring Refractive Indices of Non-opaque Materials, with Emphasis on Asbestos Analysis, *The Microscope*, 69:2, pp 51–69; <https://doi.org/10.59082/ZGWM6676>.
- 2022 Su, S.C. Area Percentage Charts to Aid Visual Estimation of Asbestos Concentration in Bulk Asbestos Samples. *The Microscope*, 69:4, 160-162. <https://doi.org/10.59082/RPCG4507>
- 2021 Su, S.C. Indexing and Interpretation of Zone-Axis SAED Patterns of Amphibole Asbestos Minerals in the Asbestos Analysis by Transmission Electron Microscopy. in *Asbestos and Other Elongate Mineral Particles—New and Continuing Challenges in the 21st Century*, ed. J. R. Millette and J. S. Webber (West Conshohocken, PA: ASTM International, 2021), 471–499. <https://doi.org/10.1520/STP163220200071>
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- 2003 Su, S.C., Instructor, Short Course on Optical Crystallography and The Spindle Stage. INTER/MICRO-03 (July 11-13, Chicago, Illinois)
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- 1998 Su, S.C., Estimating the Refractive Index Difference between a Solid Particle and an Immersion Liquid. INTER/MICRO-98 (August 10-14, Chicago, Illinois)
- 1997 Su, S.C., Improve the Proficiency in Asbestos Identification by Polarized Light Microscopy. The 15th Annual Conference of the Environmental Information Association (former National Asbestos Council), March 22 - 25, Las Vegas, Nevada.
- 1996 Su, S.C., Understanding Detection Limit and Analytical Sensitivity in TEM Airborne Asbestos Analysis. NVLAP Annual Regional Meetings (East Region: October 4, Philadelphia, PA; Central Region: October 25, Minneapolis, MN; West Region: November 1, San Francisco, CA)
- 1996 Su, S.C., Back to Basics for Bulk Asbestos Analysis. NVLAP Annual Regional Meetings (East Region: October 4, Philadelphia, PA; Central Region: October 25, Minneapolis, MN; West Region: November 1, San Francisco, CA)
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- 1989 Instructor, Short Course on Immersion Methods and Crystal Optics. August 7 - 11. Offered jointly by McCrone Research Institute and Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
- 1986 Instructor, Short Course on Optical Identification of Crystals and Minerals. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
- 1986 Instructor, Short Course on Spindle Stage and Computer Methods. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
- 1986 Su, S.C., Ribbe, P.H., and Bloss, F.D., Optical, X-ray and microprobe study of low plagioclase single crystals: Discriminant analysis of discontinuities. The 14th General Meeting, the International Mineralogical Association (July 13-18, Stanford, California), Abstract with Programs, p.267.
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Polytechnic Institute and State University, Blacksburg, Virginia.

- 1985 Instructor, Short Course on Spindle Stage and Computer Methods. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
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**Exhibit B – List of MAS Reports Reviewed in Which MAS Identifies  
“Chrysotile” by PLM in Johnson’s Baby Powder Products**

Date	MAS Project Number(s)
2/24/2020	M70484
3/6/2020	M66515 & M66516
3/18/2020	M71095
3/20/2020	M70877
4/6/2020	M71046
5/14/2020	M71095 Rev 1
9/16/2020	M71109-M71111
9/17/2020	M71166
9/23/2020	M71095 Rev 2
9/29/2020	M71166 Sup 1
12/8/2020	M71166 Sup 2
1/25/2021	M71211
2/9/2021	M71241
3/23/2021	M65329-013; M66507-001; M66508-001; M66509-001; M66513-001; M67420-001; M67420-002; M67420-004; M67420-005
4/13/2021	M71216
5/25/2021	M71228
6/4/2021	M70859
8/20/2021	M70877
3/11/2022	M71262
2/28/2023	M71614
10/19/2023	M71643
11/28/2023	M71730
2/15/2024	M71740

## **Exhibit C – Demonstrative Materials**

**IN RE JOHNSON & JOHNSON TALCUM POWDER PRODUCTS  
MARKETING, SALES PRACTICES, AND PRODUCTS LIABILITY  
LITIGATION  
MDL NO. 16-2738 (FLW) (LHG)  
MDL Report**

**Shu-Chun Su, Ph.D.**

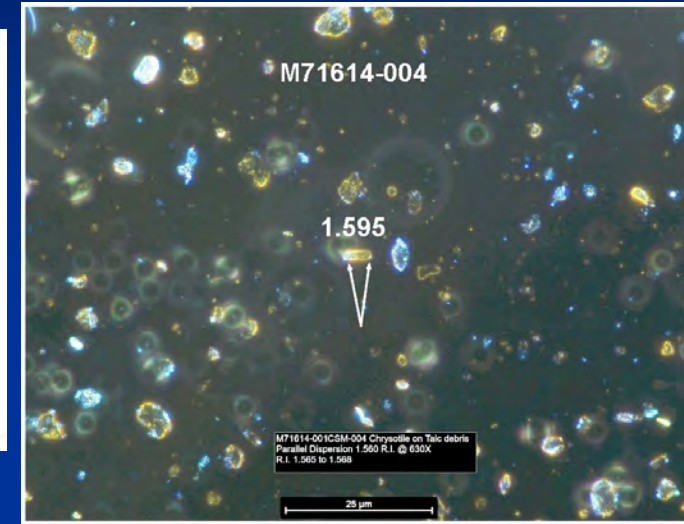
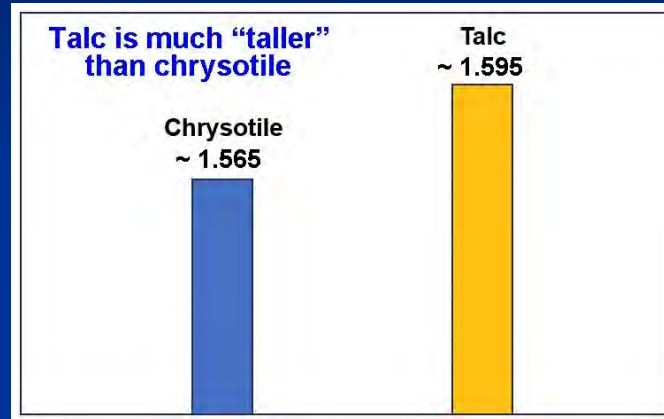
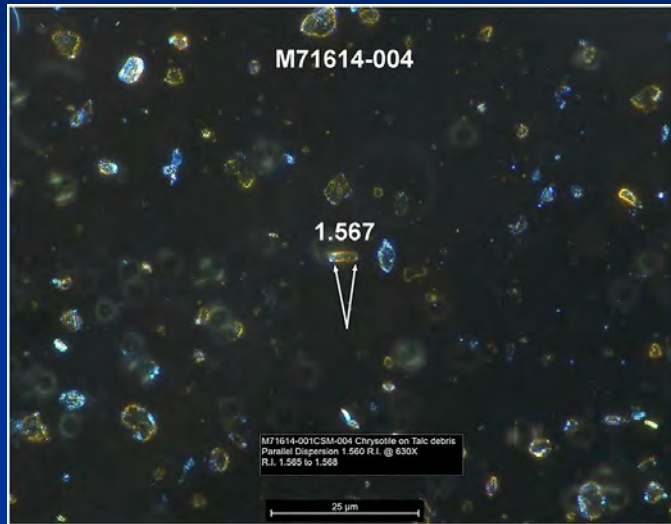
**May 21, 2024**

**Incorrect RI Measurement Procedure:  
Suppressed Light Intensity**

# Incorrect RI Measurement Procedure

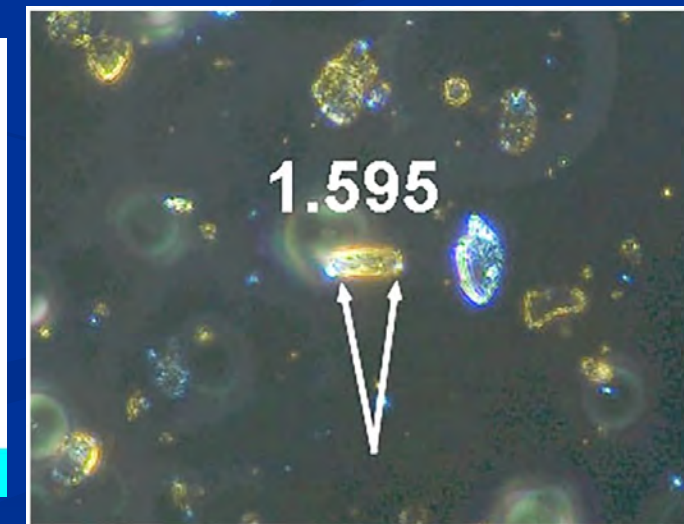
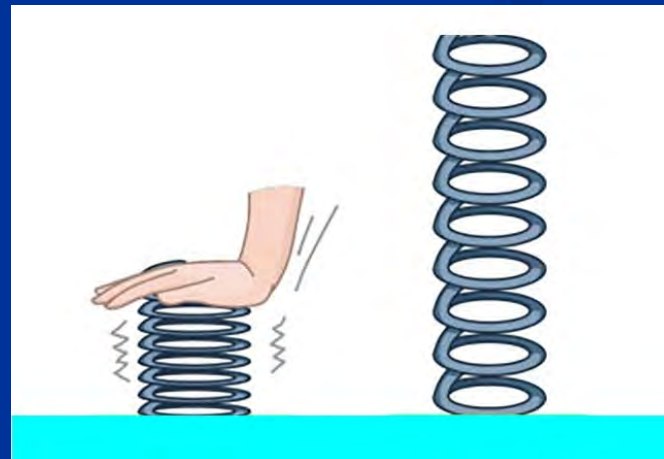
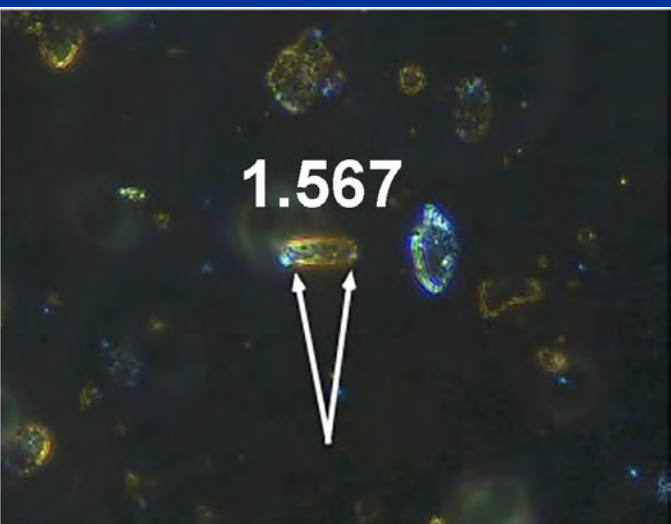
## MAS Misidentified Talc as Chrysotile

2023-02-28 - Valadez Bottle Report



Suppressed

Unsuppressed



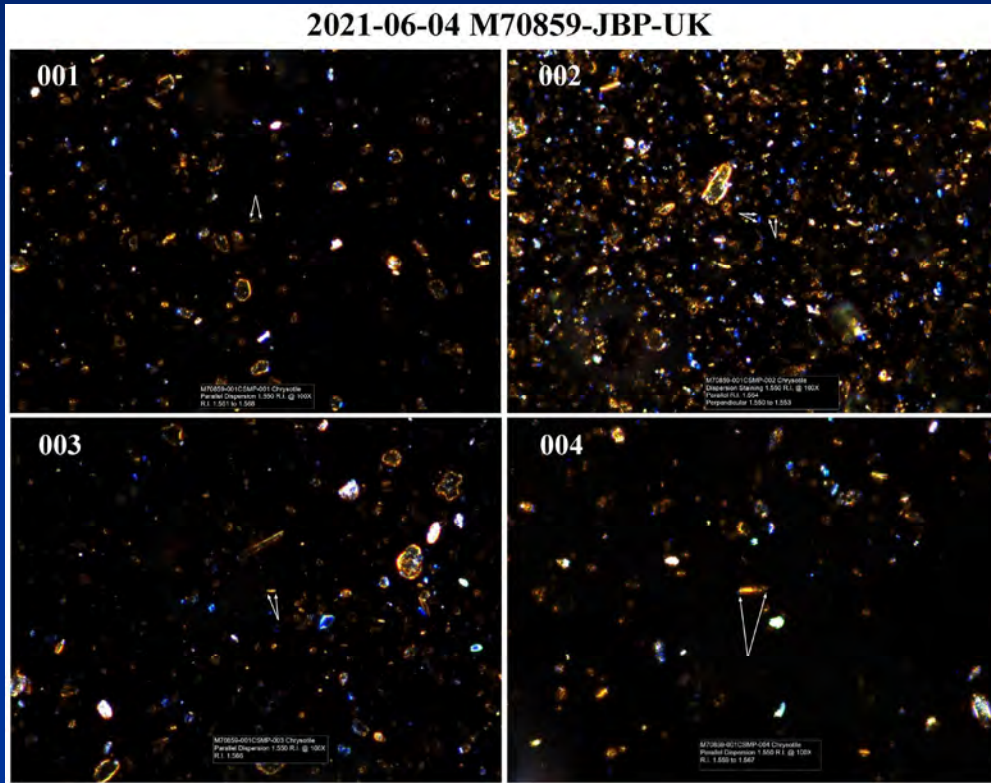


# Another Example of MAS's Suppressed Illumination

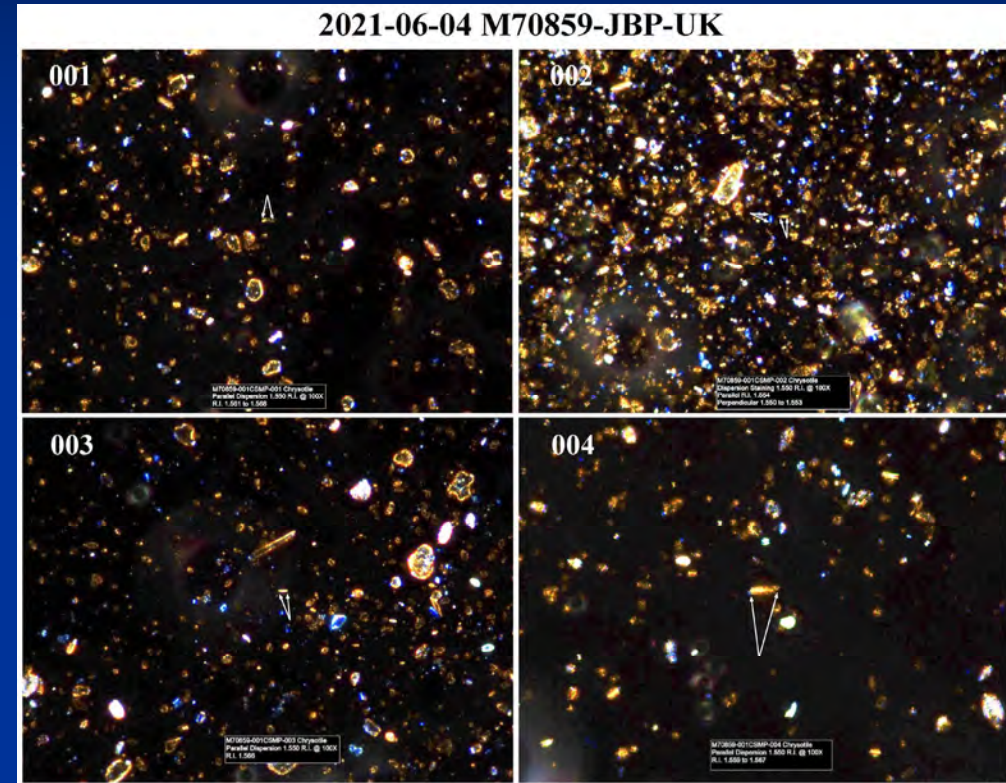
Case 3:16-md-02738-MAS-RLS Document 53-132-9 Filed 08/25/24 Page 25 of 170  
PageID: 252318

## 2021-06-04 M70859 JPB-UK

Original illumination was suppressed



Illumination unsuppressed



Correct analysis can only be conducted when the illumination is unsuppressed.



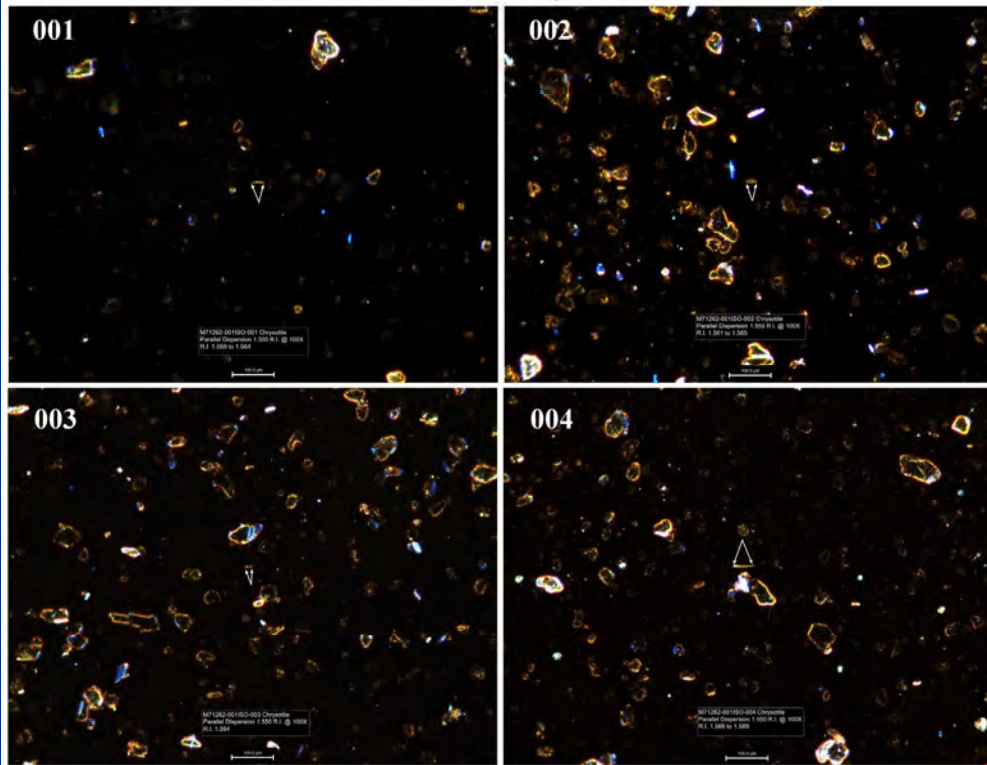
# One More Example of MAS's Suppressed Illumination

Case 3:15-md-02738-MAS-RLS Document 33-132-9 Filed 03/24/24 Page 26 of 170  
PageID: 252319

## 2022-03-11 M71612 Klayman JPB & STS

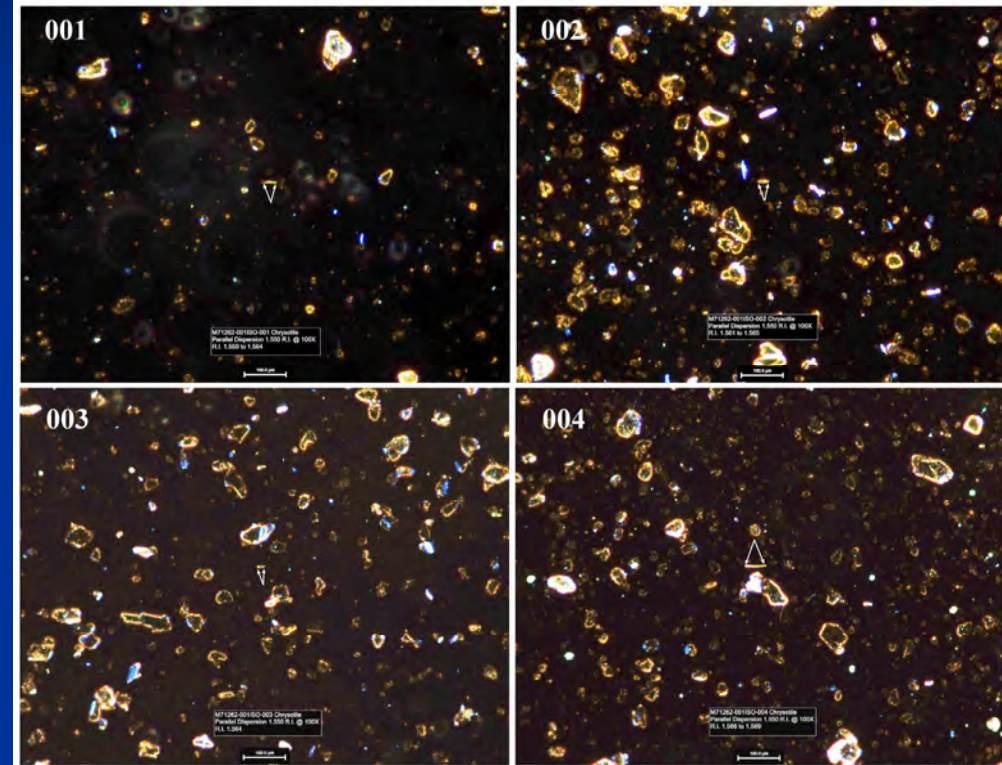
**Original illumination was suppressed**

2022-03-11 M71262-Klayman JPB & STS



**Illumination unsuppressed**

2022-03-11 M71262-Klayman JPB & STS

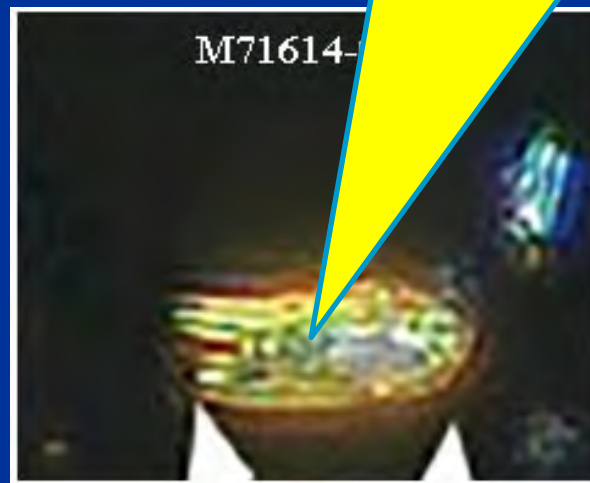
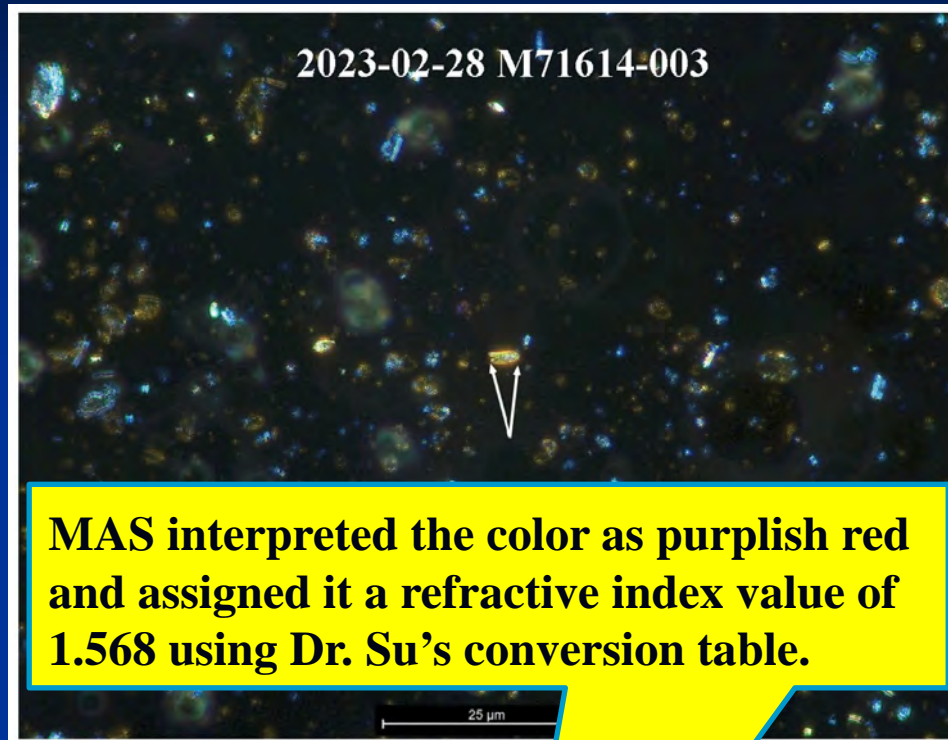
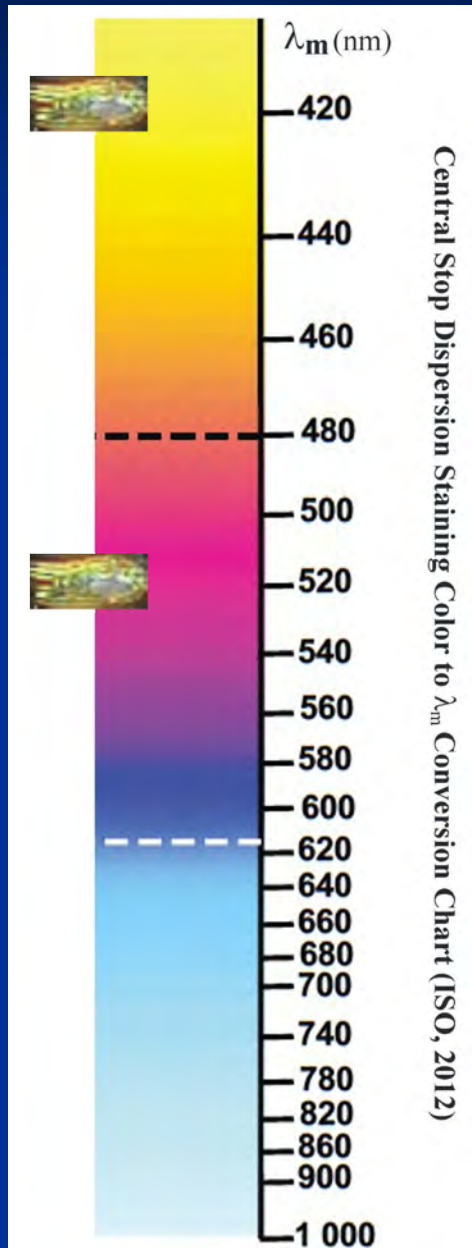


**Correct analysis can only be conducted when the illumination is unsuppressed.**

**Incorrect RI Measurement Procedure:  
Inaccurate RI Values**

# Incorrect RI Measurement Procedure

2023-02-28 - Valadez Bottle Report



M71614-003's pale yellow dispersion staining color corresponds to a matching wavelength of **410 nm**, which is converted to an RI of 1.593, indicating it is the  $\gamma'$  of talc.

Matching Wavelength to RI Cargille Liquids Page 5 of 32

**Chrysotile**  
in Cargille 1.560 (E)

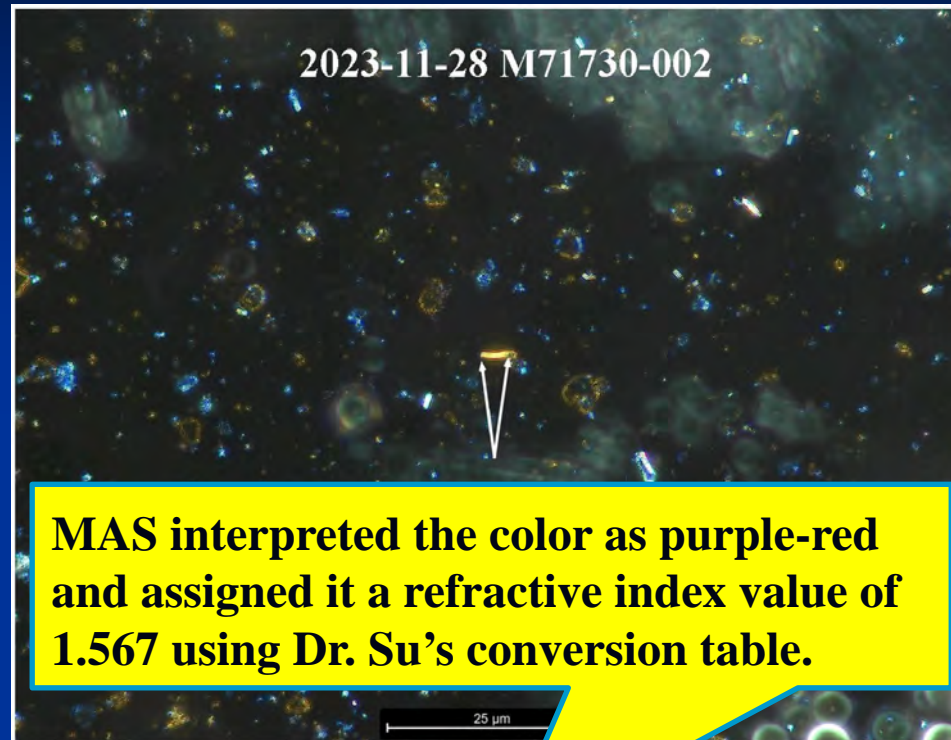
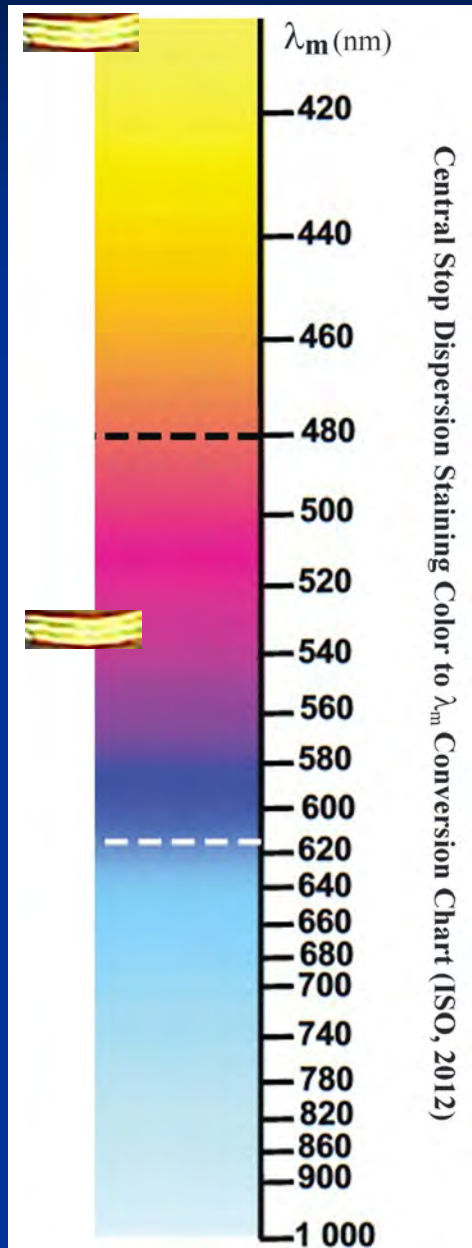
$\lambda_m$ (nm)	$\alpha$	$\gamma$
	17°C 19°C 21°C 23°C 25°C 27°C 29°C	17°C 19°C 21°C 23°C 25°C 27°C 29°C
300	1.633 1.631 1.630 1.629 1.628 1.627 1.626	1.645 1.644 1.643 1.642 1.641 1.641 1.640
320	1.632 1.631 1.630 1.629 1.628 1.627 1.627	1.637 1.636 1.635 1.634 1.633 1.632 1.631
340	1.631 1.631 1.630 1.629 1.628 1.627 1.627	1.634 1.633 1.632 1.631 1.630 1.629 1.628
360	1.630 1.630 1.629 1.628 1.627 1.626 1.626	1.631 1.630 1.629 1.628 1.627 1.626 1.625
380	1.629 1.629 1.628 1.627 1.626 1.625 1.625	1.628 1.627 1.626 1.625 1.624 1.623 1.622
400	1.628 1.628 1.627 1.626 1.625 1.624 1.624	1.625 1.624 1.623 1.622 1.621 1.620 1.619
420	1.627 1.627 1.626 1.625 1.624 1.623 1.623	1.622 1.621 1.620 1.619 1.618 1.617 1.616
440	1.626 1.626 1.625 1.624 1.623 1.622 1.622	1.619 1.618 1.617 1.616 1.615 1.614 1.613
460	1.625 1.625 1.624 1.623 1.622 1.621 1.621	1.616 1.615 1.614 1.613 1.612 1.611 1.610
480	1.624 1.624 1.623 1.622 1.621 1.620 1.620	1.613 1.612 1.611 1.610 1.609 1.608 1.607
500	1.623 1.623 1.622 1.621 1.620 1.619 1.619	1.610 1.609 1.608 1.607 1.606 1.605 1.604
520	1.622 1.622 1.621 1.620 1.619 1.618 1.618	1.607 1.606 1.605 1.604 1.603 1.602 1.601
540	1.621 1.621 1.620 1.619 1.618 1.617 1.617	1.604 1.603 1.602 1.601 1.600 1.599 1.598
560	1.620 1.620 1.619 1.618 1.617 1.616 1.616	1.601 1.600 1.599 1.598 1.597 1.596 1.595
580	1.619 1.619 1.618 1.617 1.616 1.615 1.615	1.598 1.597 1.596 1.595 1.594 1.593 1.592
600	1.618 1.618 1.617 1.616 1.615 1.614 1.614	1.595 1.594 1.593 1.592 1.591 1.590 1.589
620	1.617 1.617 1.616 1.615 1.614 1.613 1.613	1.592 1.591 1.590 1.589 1.588 1.587 1.586
640	1.616 1.616 1.615 1.614 1.613 1.612 1.612	1.589 1.588 1.587 1.586 1.585 1.584 1.583
660	1.615 1.615 1.614 1.613 1.612 1.611 1.611	1.586 1.585 1.584 1.583 1.582 1.581 1.580
680	1.614 1.614 1.613 1.612 1.611 1.610 1.610	1.583 1.582 1.581 1.580 1.579 1.578 1.577
700	1.613 1.613 1.612 1.611 1.610 1.609 1.609	1.580 1.579 1.578 1.577 1.576 1.575 1.574
720	1.612 1.612 1.611 1.610 1.609 1.608 1.608	1.577 1.576 1.575 1.574 1.573 1.572 1.571
740	1.611 1.611 1.610 1.609 1.608 1.607 1.607	1.574 1.573 1.572 1.571 1.570 1.569 1.568
760	1.610 1.610 1.609 1.608 1.607 1.606 1.606	1.571 1.570 1.569 1.568 1.567 1.566 1.565
780	1.609 1.609 1.608 1.607 1.606 1.605 1.605	1.568 1.567 1.566 1.565 1.564 1.563 1.562
800	1.608 1.608 1.607 1.606 1.605 1.604 1.604	1.565 1.564 1.563 1.562 1.561 1.560 1.559
820	1.607 1.607 1.606 1.605 1.604 1.603 1.603	1.562 1.561 1.560 1.559 1.558 1.557 1.556
840	1.606 1.606 1.605 1.604 1.603 1.602 1.602	1.559 1.558 1.557 1.556 1.555 1.554 1.553
860	1.605 1.605 1.604 1.603 1.602 1.601 1.601	1.556 1.555 1.554 1.553 1.552 1.551 1.550
880	1.604 1.604 1.603 1.602 1.601 1.600 1.600	1.553 1.552 1.551 1.550 1.549 1.548 1.547
900	1.603 1.603 1.602 1.601 1.600 1.599 1.599	1.550 1.549 1.548 1.547 1.546 1.545 1.544
920	1.602 1.602 1.601 1.600 1.599 1.598 1.598	1.547 1.546 1.545 1.544 1.543 1.542 1.541
940	1.601 1.601 1.600 1.599 1.598 1.597 1.597	1.544 1.543 1.542 1.541 1.540 1.539 1.538
960	1.600 1.600 1.599 1.598 1.597 1.596 1.596	1.541 1.540 1.539 1.538 1.537 1.536 1.535
980	1.599 1.599 1.598 1.597 1.596 1.595 1.595	1.538 1.537 1.536 1.535 1.534 1.533 1.532
1000	1.598 1.598 1.597 1.596 1.595 1.594 1.594	1.535 1.534 1.533 1.532 1.531 1.530 1.529

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# Incorrect RI Measurement Procedure

2023-11-28 - Henderson-Longo Supp. J&J Report



Matching Wavelength to RI Cargille Liquids Page 5 of 32

**Chrysotile in Cargille 1.560 (E)**

$\lambda_m$ (nm)	$\alpha$					$\gamma$				
	15°C	20°C	25°C	30°C	35°C	15°C	20°C	25°C	30°C	35°C
300	1.633	1.633	1.630	1.628	1.627	1.645	1.644	1.643	1.641	1.641
320	1.632	1.631	1.630	1.628	1.627	1.643	1.642	1.641	1.639	1.639
340	1.631	1.631	1.630	1.628	1.627	1.642	1.641	1.640	1.638	1.638
360	1.630	1.630	1.629	1.627	1.626	1.641	1.640	1.639	1.637	1.637
380	1.629	1.629	1.628	1.626	1.625	1.640	1.639	1.638	1.636	1.636
400	1.628	1.628	1.627	1.625	1.624	1.639	1.638	1.637	1.635	1.635
420	1.627	1.627	1.626	1.624	1.623	1.638	1.637	1.636	1.634	1.634
440	1.626	1.626	1.625	1.623	1.622	1.637	1.636	1.635	1.633	1.633
460	1.625	1.625	1.624	1.622	1.621	1.636	1.635	1.634	1.632	1.632
480	1.624	1.624	1.623	1.621	1.620	1.635	1.634	1.633	1.631	1.631
500	1.623	1.623	1.622	1.620	1.619	1.634	1.633	1.632	1.630	1.630
520	1.622	1.622	1.621	1.619	1.618	1.633	1.632	1.631	1.629	1.629
540	1.621	1.621	1.620	1.618	1.617	1.632	1.631	1.630	1.628	1.628
560	1.620	1.620	1.619	1.617	1.616	1.631	1.630	1.629	1.627	1.627
580	1.619	1.619	1.618	1.616	1.615	1.630	1.629	1.628	1.626	1.626
600	1.618	1.618	1.617	1.615	1.614	1.629	1.628	1.627	1.625	1.625
620	1.617	1.617	1.616	1.614	1.613	1.628	1.627	1.626	1.624	1.624
640	1.616	1.616	1.615	1.613	1.612	1.627	1.626	1.625	1.623	1.623
660	1.615	1.615	1.614	1.612	1.611	1.626	1.625	1.624	1.622	1.622
680	1.614	1.614	1.613	1.611	1.610	1.625	1.624	1.623	1.621	1.621
700	1.613	1.613	1.612	1.610	1.609	1.624	1.623	1.622	1.620	1.620
720	1.612	1.612	1.611	1.609	1.608	1.623	1.622	1.621	1.619	1.619
740	1.611	1.611	1.610	1.608	1.607	1.622	1.621	1.620	1.618	1.618
760	1.610	1.610	1.609	1.607	1.606	1.621	1.620	1.619	1.617	1.617
780	1.609	1.609	1.608	1.606	1.605	1.620	1.619	1.618	1.616	1.616
800	1.608	1.608	1.607	1.605	1.604	1.619	1.618	1.617	1.615	1.615
820	1.607	1.607	1.606	1.604	1.603	1.618	1.617	1.616	1.614	1.614
840	1.606	1.606	1.605	1.603	1.602	1.617	1.616	1.615	1.613	1.613
860	1.605	1.605	1.604	1.602	1.601	1.616	1.615	1.614	1.612	1.612
880	1.604	1.604	1.603	1.601	1.600	1.615	1.614	1.613	1.611	1.611
900	1.603	1.603	1.602	1.600	1.599	1.614	1.613	1.612	1.610	1.610
920	1.602	1.602	1.601	1.599	1.598	1.613	1.612	1.611	1.609	1.609
940	1.601	1.601	1.600	1.598	1.597	1.612	1.611	1.610	1.608	1.608
960	1.600	1.600	1.599	1.597	1.596	1.611	1.610	1.609	1.607	1.607
980	1.599	1.599	1.598	1.596	1.595	1.610	1.609	1.608	1.606	1.606
1000	1.598	1.598	1.597	1.595	1.594	1.609	1.608	1.607	1.605	1.605

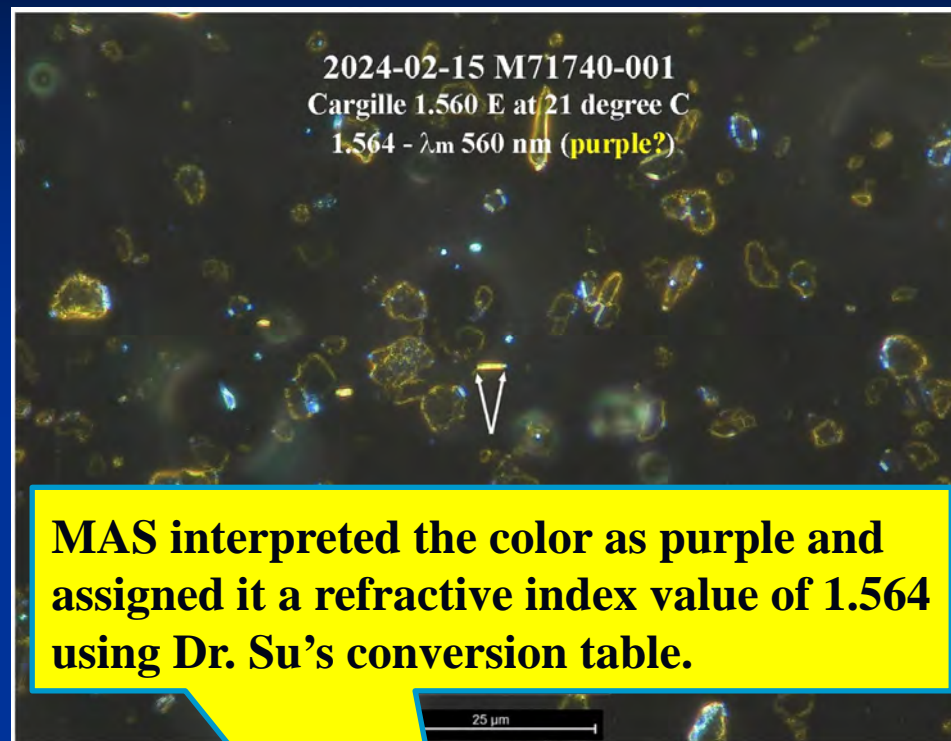
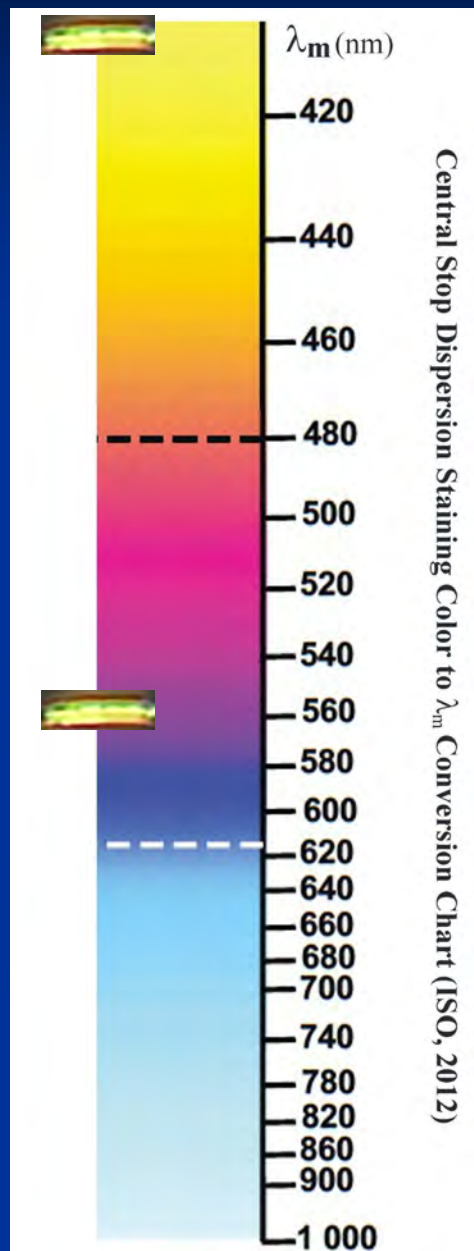
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M71730-002's pale yellow dispersion staining color corresponds to a matching wavelength of **400 nm**, which is converted to an RI of 1.597, indicating it is the  $\gamma$  of talc.

# Incorrect RI Measurement Procedure

## 2024-02-15 M71740 Analysis of JBP (Rochelle Kirch) Compiled Notebook



Matching Wavelength to RI Cargille Liquids Page 5 of 32

**Chrysotile**  
in Cargille 1.560 (E)

$\lambda_m$ (nm)	$\alpha$					$\gamma$				
	15°C	20°C	25°C	30°C	35°C	15°C	20°C	25°C	30°C	35°C
300	1.633	1.631	1.630	1.628	1.627	1.645	1.644	1.643	1.641	1.640
320	1.632	1.631	1.630	1.628	1.627	1.644	1.643	1.642	1.640	1.639
340	1.631	1.630	1.629	1.627	1.626	1.643	1.642	1.641	1.639	1.638
360	1.630	1.629	1.628	1.626	1.625	1.642	1.641	1.640	1.638	1.637
380	1.629	1.628	1.627	1.625	1.624	1.641	1.640	1.639	1.637	1.636
400	1.628	1.627	1.626	1.624	1.623	1.640	1.639	1.638	1.636	1.635
420	1.627	1.626	1.625	1.623	1.622	1.639	1.638	1.637	1.635	1.634
440	1.626	1.625	1.624	1.622	1.621	1.638	1.637	1.636	1.634	1.633
460	1.625	1.624	1.623	1.621	1.620	1.637	1.636	1.635	1.633	1.632
480	1.624	1.623	1.622	1.620	1.619	1.636	1.635	1.634	1.632	1.631
500	1.623	1.622	1.621	1.619	1.618	1.635	1.634	1.633	1.631	1.630
520	1.622	1.621	1.620	1.618	1.617	1.634	1.633	1.632	1.630	1.629
540	1.621	1.620	1.619	1.617	1.616	1.633	1.632	1.631	1.629	1.628
560	1.620	1.619	1.618	1.616	1.615	1.632	1.631	1.630	1.628	1.627
580	1.619	1.618	1.617	1.615	1.614	1.631	1.630	1.629	1.627	1.626
600	1.618	1.617	1.616	1.614	1.613	1.630	1.629	1.628	1.626	1.625
620	1.617	1.616	1.615	1.613	1.612	1.629	1.628	1.627	1.625	1.624
640	1.616	1.615	1.614	1.612	1.611	1.628	1.627	1.626	1.624	1.623
660	1.615	1.614	1.613	1.611	1.610	1.627	1.626	1.625	1.623	1.622
680	1.614	1.613	1.612	1.610	1.609	1.626	1.625	1.624	1.622	1.621
700	1.613	1.612	1.611	1.609	1.608	1.625	1.624	1.623	1.621	1.620
720	1.612	1.611	1.610	1.608	1.607	1.624	1.623	1.622	1.620	1.619
740	1.611	1.610	1.609	1.607	1.606	1.623	1.622	1.621	1.619	1.618
760	1.610	1.609	1.608	1.606	1.605	1.622	1.621	1.620	1.618	1.617
780	1.609	1.608	1.607	1.605	1.604	1.621	1.620	1.619	1.617	1.616
800	1.608	1.607	1.606	1.604	1.603	1.620	1.619	1.618	1.616	1.615
820	1.607	1.606	1.605	1.603	1.602	1.619	1.618	1.617	1.615	1.614
840	1.606	1.605	1.604	1.602	1.601	1.618	1.617	1.616	1.614	1.613
860	1.605	1.604	1.603	1.601	1.600	1.617	1.616	1.615	1.613	1.612
880	1.604	1.603	1.602	1.600	1.599	1.616	1.615	1.614	1.612	1.611
900	1.603	1.602	1.599	1.598	1.597	1.615	1.614	1.613	1.611	1.610
920	1.602	1.599	1.598	1.596	1.595	1.614	1.613	1.612	1.610	1.609
940	1.601	1.598	1.597	1.595	1.594	1.613	1.612	1.611	1.609	1.608
960	1.600	1.597	1.596	1.594	1.593	1.612	1.611	1.610	1.608	1.607
980	1.599	1.596	1.595	1.593	1.592	1.611	1.610	1.609	1.607	1.606
1000	1.598	1.595	1.594	1.592	1.591	1.610	1.609	1.608	1.606	1.605

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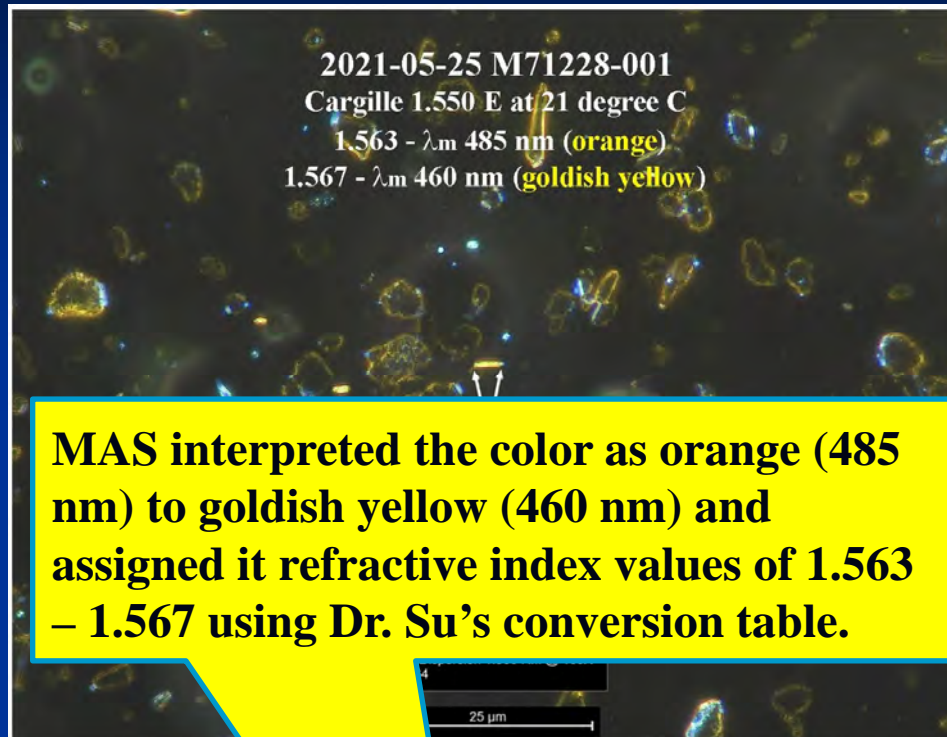
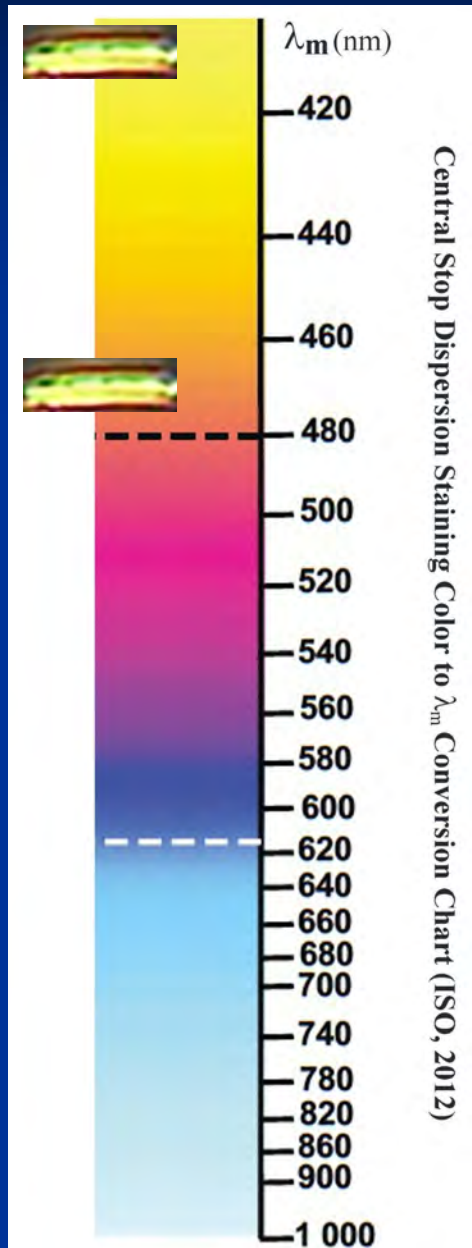
M71740-001's pale yellow dispersion staining color corresponds to a matching wavelength of **400 nm**, which is converted to an RI of 1.597, indicating it is the  $\gamma$  of talc.

**Incorrect RI Measurement Procedure:  
Problem Persists for Years**



# Incorrect RI Measurement Procedure

## 2021-05-25 M71228 OTShelf JBP Purchased Argentina



Matching Wavelength to RI Cargille Liquids Page 3 of 32

**Chrysotile**  
in Cargille 1.550 (E-Bulk Bottle)

$\lambda_m$ (nm)	19°C	21°C	23°C	25°C	27°C	29°C	19°C	21°C	23°C	25°C	27°C	29°C
500	1.548	1.547	1.546	1.545	1.544	1.543	1.541	1.540	1.539	1.538	1.537	1.535
520	1.527	1.526	1.525	1.524	1.523	1.522	1.520	1.519	1.518	1.517	1.515	1.513
540	1.512	1.511	1.510	1.509	1.508	1.507	1.505	1.504	1.503	1.502	1.500	1.498
560	1.500	1.499	1.498	1.497	1.496	1.495	1.493	1.492	1.491	1.490	1.488	1.486
580	1.492	1.491	1.490	1.489	1.488	1.487	1.485	1.484	1.483	1.482	1.480	1.478
600	1.485	1.484	1.483	1.482	1.481	1.480	1.478	1.477	1.476	1.475	1.473	1.471
620	1.479	1.478	1.477	1.476	1.475	1.474	1.472	1.471	1.470	1.469	1.467	1.465
640	1.474	1.473	1.472	1.471	1.470	1.469	1.467	1.466	1.465	1.464	1.462	1.460
660	1.470	1.469	1.468	1.467	1.466	1.465	1.463	1.462	1.461	1.460	1.458	1.456
680	1.467	1.466	1.465	1.464	1.463	1.462	1.460	1.459	1.458	1.457	1.455	1.453
700	1.464	1.463	1.462	1.461	1.460	1.459	1.457	1.456	1.455	1.454	1.452	1.450
720	1.461	1.460	1.459	1.458	1.457	1.456	1.454	1.453	1.452	1.451	1.449	1.447
740	1.459	1.458	1.457	1.456	1.455	1.454	1.452	1.451	1.450	1.449	1.447	1.445
760	1.457	1.456	1.455	1.454	1.453	1.452	1.450	1.449	1.448	1.447	1.445	1.443
780	1.455	1.454	1.453	1.452	1.451	1.450	1.448	1.447	1.446	1.445	1.443	1.441
800	1.453	1.452	1.451	1.450	1.449	1.448	1.446	1.445	1.444	1.443	1.441	1.439
820	1.452	1.451	1.450	1.449	1.448	1.447	1.445	1.444	1.443	1.442	1.440	1.438
840	1.450	1.449	1.448	1.447	1.446	1.445	1.443	1.442	1.441	1.440	1.438	1.436
860	1.448	1.447	1.446	1.445	1.444	1.443	1.441	1.440	1.439	1.438	1.436	1.434
880	1.447	1.446	1.445	1.444	1.443	1.442	1.440	1.439	1.438	1.437	1.435	1.433
900	1.446	1.445	1.444	1.443	1.442	1.441	1.439	1.438	1.437	1.436	1.434	1.432
920	1.445	1.444	1.443	1.442	1.441	1.440	1.438	1.437	1.436	1.435	1.433	1.431
940	1.444	1.443	1.442	1.441	1.440	1.439	1.437	1.436	1.435	1.434	1.432	1.430
960	1.443	1.442	1.441	1.440	1.439	1.438	1.436	1.435	1.434	1.433	1.431	1.429
980	1.442	1.441	1.440	1.439	1.438	1.437	1.435	1.434	1.433	1.432	1.430	1.428
1000	1.441	1.440	1.439	1.438	1.437	1.436	1.434	1.433	1.432	1.431	1.429	1.427

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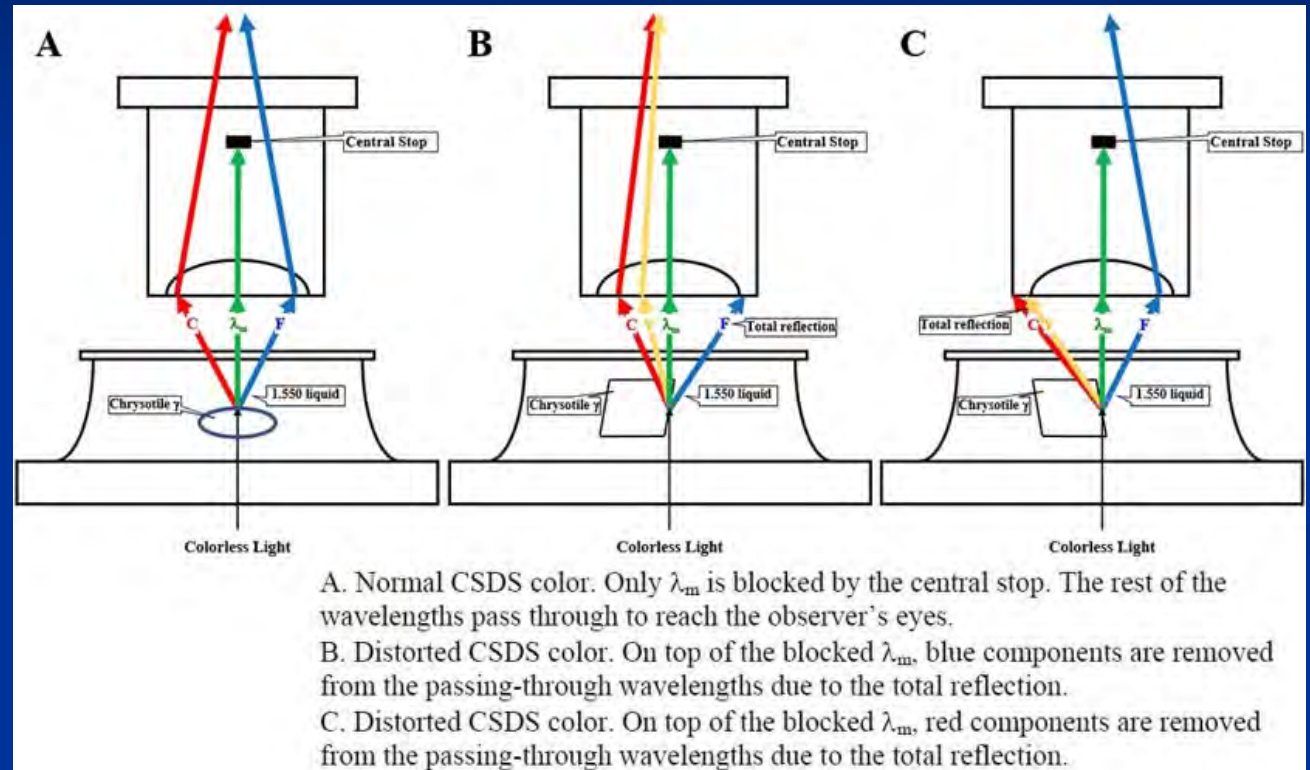


# Incorrect RI Measurement Procedure

**The variation of dispersion staining color is due to the total reflection**



It is wrong for MAS to interpret the purple-red CSDS color at the edge as the representative color for the RI assignment because it fits the inaccurate chrysotile theory. It is a distorted CS color due to total reflection at the liquid-solid interface. The pale yellow is the right color to choose.



**This image explains the physics of how total reflection occurs.**

**By failing to consider the distortion of dispersion staining colors caused by total reflection, MAS used the wrong dispersion staining color and assigned incorrect RI values.**

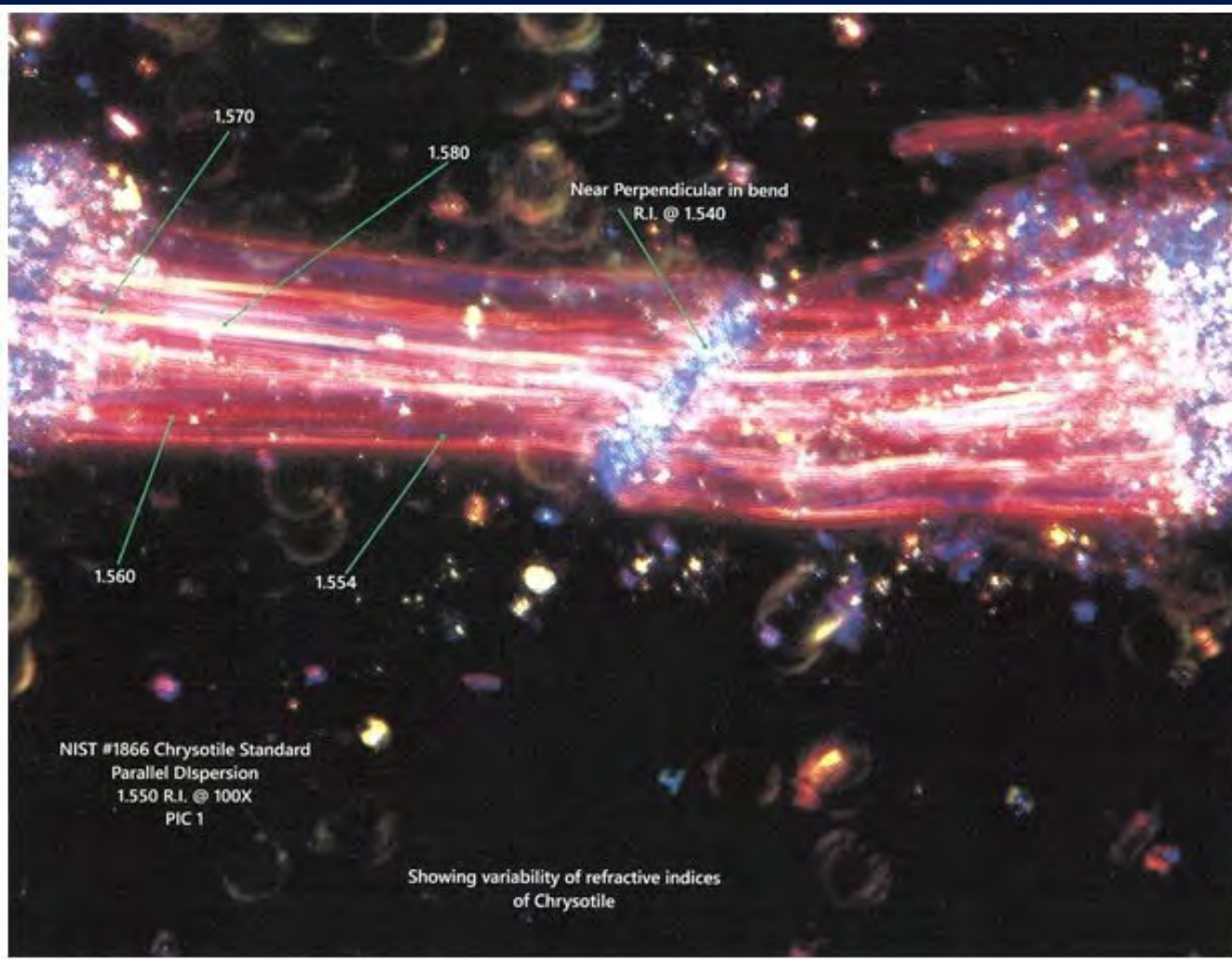
# There is No Variability of Refractive Index within a Bundle

Case 3:16-md-02728-MAS-RLS Document 331-32 Filed 08/23/24 Page 34 of 170  
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It is wrong for MAS to interpret the variation of dispersion staining color as the variation of refractive index within the bundle.

A mineral's RI is a constant governed by their chemical composition and crystal structure. MAS's theory that chrysotile's RI increases as the particle size decreases is unfounded and defies basic principles of physics. In fact, if such a theory is proved, it would shake the very foundation of physics.

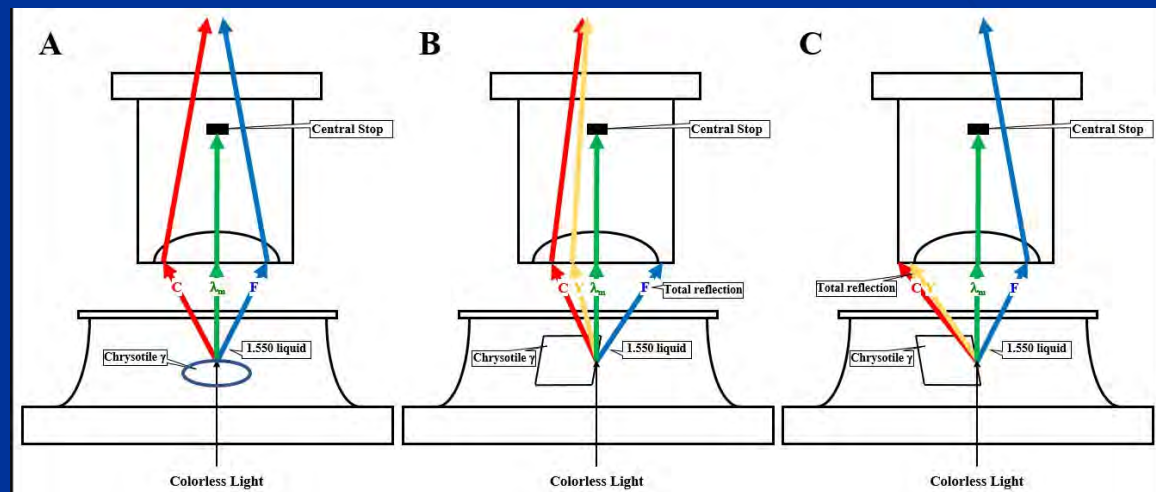
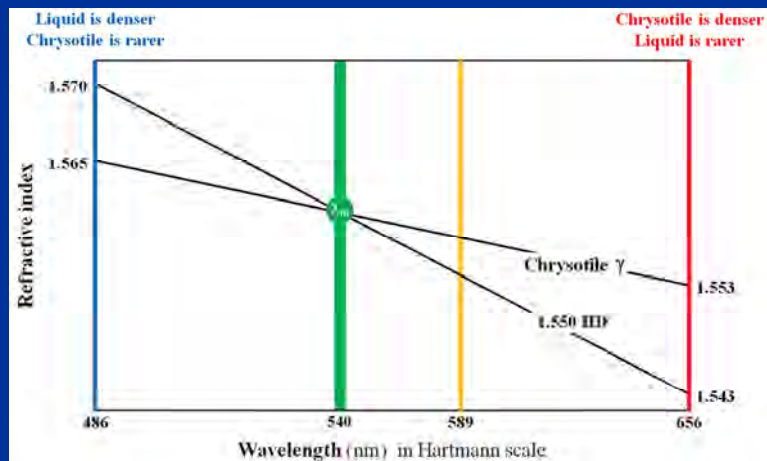
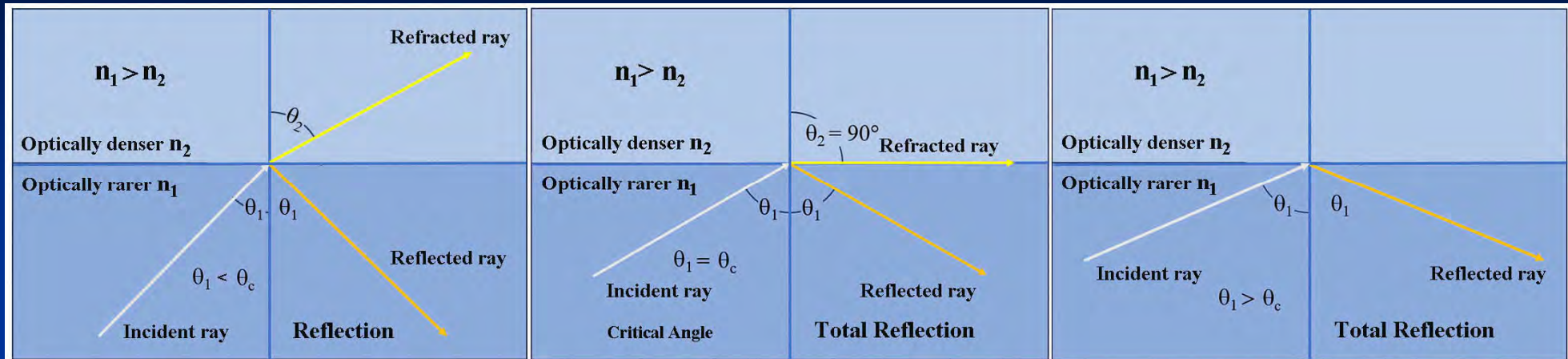
The variation of dispersion staining color is caused by the total reflection occurring at the liquid-solid interface





# There is No Variability of Refractive Index within a Bundle

## Understanding the formation of distorted dispersion staining color



$\lambda$	Color	$\gamma$	1.551 E	Critical Angle
486 nm	Blue	1.570	1.567	86.5°
656 nm	Red	1.553	1.543	83.5°

When light transmits from an optically denser (greater RI) to an optically rarer (smaller RI) medium, total internal reflection occurs at the critical angle.

The total reflection wavelengths are removed from the non-matching wavelength spectrum, resulting in the distorted dispersion staining color.

# There is No Variability of Refractive Index within a Bundle

Table 1. Certified Values of Refractive Index for Chrysotile Asbestos in SRM 1866b

Wavelength (nm)	$\alpha$			$\gamma$		
	Lower Limit <sup>(a)</sup>	Fitted Value	Upper Limit	Lower Limit	Fitted Value	Upper Limit
460	1.554	1.558	1.563	1.563	1.568	1.572
480	1.552	1.557	1.561	1.561	1.565	1.569
500	1.551	1.555	1.559	1.559	1.563	1.567
520	1.549	1.553	1.557	1.557	1.561	1.565
540	1.548	1.552	1.556	1.556	1.560	1.564
560	1.547	1.551	1.555	1.554	1.558	1.562
<b>589.3</b>	1.545	<b>1.549</b>	1.553	1.552	<b>1.556</b>	1.560
600	1.545	1.549	1.553	1.551	1.556	1.560
620	1.544	1.548	1.552	1.550	1.554	1.559
640	1.543	1.547	1.551	1.549	1.553	1.558

**The certified refractive index values in the certificate issued by NIST for SRM 1866 apply to every fiber and fiber bundle in the standard reference material.**

# Refractive Index Does Not Change With the Particle Size

Case 3:16-md-02738-MAS-PLS Document 331-32-9 Filed 08/23/24 Page 37 of 170  
PageID #: 150331

Table 1. Certified Values of Refractive Index for Chrysotile Asbestos in SRM 1866b

Wavelength (nm)	$\alpha$			$\gamma$		
	Lower Limit <sup>(a)</sup>	Fitted Value	Upper Limit	Lower Limit	Fitted Value	Upper Limit
460	1.554	1.558	1.563	1.563	1.568	1.572
480	1.552	1.557	1.561	1.561	1.565	1.569
500	1.551	1.555	1.559	1.559	1.563	1.567
520	1.549	1.553	1.557	1.557	1.561	1.565
540	1.548	1.552	1.556	1.556	1.560	1.564
560	1.547	1.551	1.555	1.554	1.558	1.562
<b>589.3</b>	1.545	<b>1.549</b>	1.553	1.552	<b>1.556</b>	1.560
600	1.545	1.549	1.553	1.551	1.556	1.560
620	1.544	1.548	1.552	1.550	1.554	1.559
640	1.543	1.547	1.551	1.549	1.553	1.558

**A mineral's RI is a constant governed by their chemical composition and crystal structure. MAS's theory that chrysotile's RI increases as the particle size decreases is unfounded and defies basic principles of physics. In fact, if such a theory is proved, it would shake the very foundation of physics.**

**The NIST SRM 1866 chrysotile RI values,  $\alpha$  1.549 and  $\gamma$  1.556, were measured by John Phelps, a scientist at NIST, on a single fiber using the spindle stage technique. Dr. Longo's fibers cannot be any thinner than John Phelps's single chrysotile fiber. Dr. Longo's claim is not only unfounded but also without the support of credible measurement data.**



### SAMPLE 1

Sample 1 is a “pure”, short range (short fiber) chrysotile from the New Idria serpentinite body of California. The sample is white, very homogeneous, and contains very short fibers/bundles (often  $< 20\mu\text{m}$ ) of chrysotile. The asbestiform habit of the chrysotile (and the optical properties) are best observed by viewing at high magnification (400 - 500X). The mean refractive indices are 1.560 for  $\gamma$  and 1.555 for  $\alpha$ . Chrysotile comprises  $>95\%$  of the sample.

Of the 257 participating laboratories, eight did not report asbestos for this sample and one reported a different asbestos type. Ten laboratories reported one or both refractive indices outside the acceptance ranges for the chrysotile. Twenty-two laboratories reported an asbestos concentration outside the acceptance range.

**The certified 1866 chrysotile RI values are  $\alpha$  1.549 and  $\gamma$  1.556.  
The certified Calidria chrysotile RI values are  $\alpha$  1.555 and  $\gamma$  1.560.  
Dr. Longo’s RI values are another leap beyond the Calidria  
chrysotile RI values.**

**Table 5**  
**Comparison of Chrysotile Measured Refractive Indexes Between**  
**MAS, Dr. McCrone and Dr. Su**

	Refractive Index Range Parallel	Refractive Index Range Perpendicular
MAS	ISO 1.568 to 1.561 CSM 1.568 to 1.564	ISO 1.558 to 1.550 CSM 1.556 to 1.550
Dr. McCrone	1.570 to 1.548	1.553 to 1.534
Dr. Su	1.580 to 1.540	1.579 to 1.541

**MAS  
misinterpreted  
my table (Su,  
2003)**

*American Mineralogist, Volume 88, pages 1979–1982, 2003*

**A rapid and accurate procedure for the determination of refractive indices of regulated  
asbestos minerals**

**SHU-CHUN SU\***

Hercules Incorporated, Research Center, 500 Hercules Road, Wilmington, Delaware 19808, U.S.A.

**ABSTRACT**

By using dispersion staining methods and pre-constructed conversion tables, it is possible to quickly and accurately determine two principal refractive indices (RI) of the six regulated asbestos minerals, chrysotile, grunerite (amosite), riebeckite (crocidolite), tremolite, actinolite, and anthophyllite, in a single immersion oil mount. This procedure is especially suitable for commercial environmental laboratories specializing in the analysis of asbestos components in bulk building materials. The effectiveness of this practical procedure has been proven through rigorous testing and extensive usage over the last decade by the majority of environmental laboratories in the U.S. The principle of this procedure is also readily applicable to RI determination in other applications: mineralogy, forensics, pharmaceutical research, particle identification, etc.



**TABLE 3. Conversion of the matching wavelength  $\lambda_m$  to the corresponding RI values**

Mineral	Chrysotile	Amosite	Crocidolite	Tremolite			Actinolite or Anthophyllite		
Oil $n_D^{20}$	1.550	1.680	1.700	1.620	1.610	1.635	1.625	1.610	1.635
Oil Series	E	B	B	E	E	E	E	E	E
RI	$n_o$ or $n_e$	$n_o$ or $n_e$	$n_o$ or $n_e$	$n_o$ or $n_e$	$n_o$ or $n_e$	$n_o$ or $n_e$	$n_o$ or $n_e$	$n_o$ or $n_e$	$n_o$ or $n_e$
$\lambda_m$ (nm)									
400	1.548								1.666
420	1.548								1.660
440	1.548								1.655
460	1.548								1.651
480	1.548								1.648
500	1.548								1.645
520	1.548								1.642
540	1.548								1.640
560	1.548								1.638
580	1.548								1.636
589	1.548								1.635
600	1.548								1.634
620	1.548	1.678	1.697	1.618	1.608	1.632	1.623	1.608	1.633
640	1.546	1.677	1.695	1.616	1.606	1.631	1.621	1.607	1.631
660	1.545	1.676	1.694	1.615	1.605	1.630	1.620	1.606	1.630
680	1.544	1.675	1.692	1.614	1.604	1.628	1.619	1.605	1.629
700	1.543								1.628
720	1.542								1.627
740	1.541								1.626
760	1.540								1.625
780	1.539								1.624
800	1.538								1.624
850	1.536								1.622
900	1.534								1.621
1000	1.532								1.618
$\Delta^e$	0.0291								0.0291
$\Delta^o$	0.0127								0.0127
$\Delta^e - \Delta^o$	0.0164								0.0164

Note: Temperature correction: If oil temperature is not 20°C, for every 1°C decrease (increase) in temperature, add (subtract) 0.001 to (from) the listed values.

The range of each asbestos's RI values in the table must be wider than its possible minimum and maximum RI values.

It doesn't mean the range represents the possible minimum and maximum RI values of chrysotile or other asbestos minerals.

**Table 5**  
**Comparison of Chrysotile Measured Refractive Indexes Between MAS, Dr. McCrone and Dr. Su**

	Refractive Index Range	
	Parallel	Perpendicular
MAS	ISO 1.568 to 1.561 CSM 1.568 to 1.564	ISO 1.558 to 1.550 CSM 1.556 to 1.550
Dr. McCrone	1.570 to 1.548	1.553 to 1.534
Dr. Su	1.580 to 1.540	1.579 to 1.541

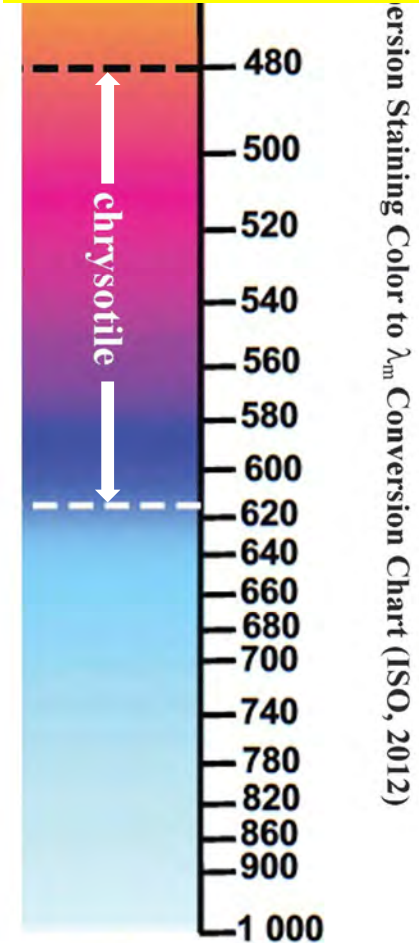
MAS misinterpreted the ranges of my table are the possible minimum and maximum values of chrysotile's refractive indices.

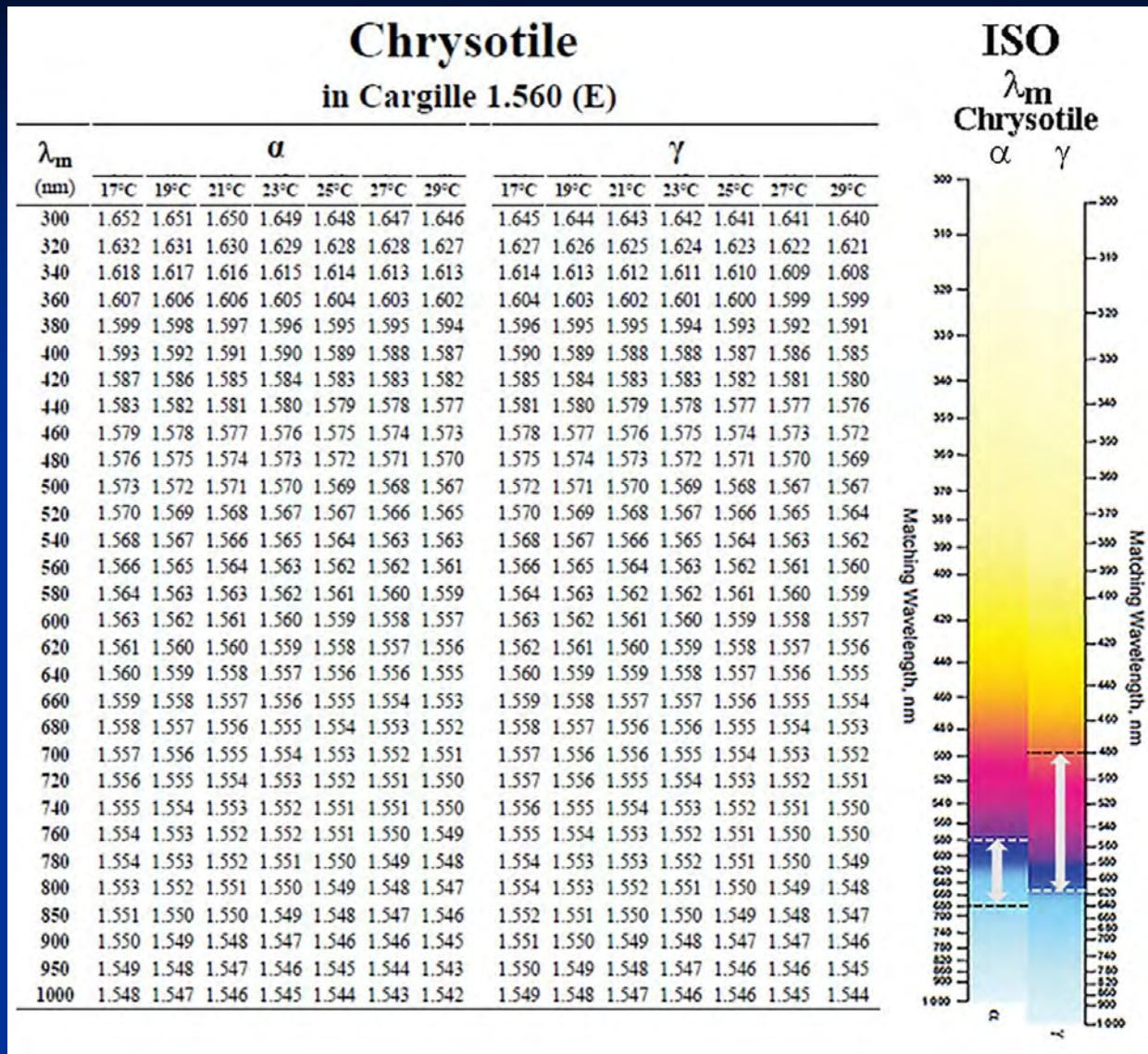
The kindergarten stadiometer must be taller than the possible heights of children. It doesn't mean that kindergarten students can be six feet tall.



$\lambda_m$  (nm)

Like the ISO DS color chart, it's much wider than the possible chrysotile refractive index range.





Although the possible RI ranges of chrysotile  $\alpha$  &  $\gamma$  are only a small section (between the dotted lines) of the CSDS color chart, the chart must cover the whole  $\lambda_m$  spectrum from 300 to 1000 nm. So does my conversion table. The ranges of the ISO chart and my table must be much wider than the RI range (between the dotted lines) of chrysotile. For people who understand the principle, my table is the **numerical version** of the ISO graphic chart.



THE MICROSCOPE • Vol. 69:2, pp 51-69, 2022

## The Dispersion Staining Technique and Its Application to Measuring Refractive Indices of Non-opaque Materials, with Emphasis on Asbestos Analysis

Shu-Chun Su, Ph.D.

Technical Expert, National Voluntary Laboratory Accreditation Program  
National Institute of Standards and Technology<sup>1</sup>

### 3. Select a proper RI liquid to mount the sample.

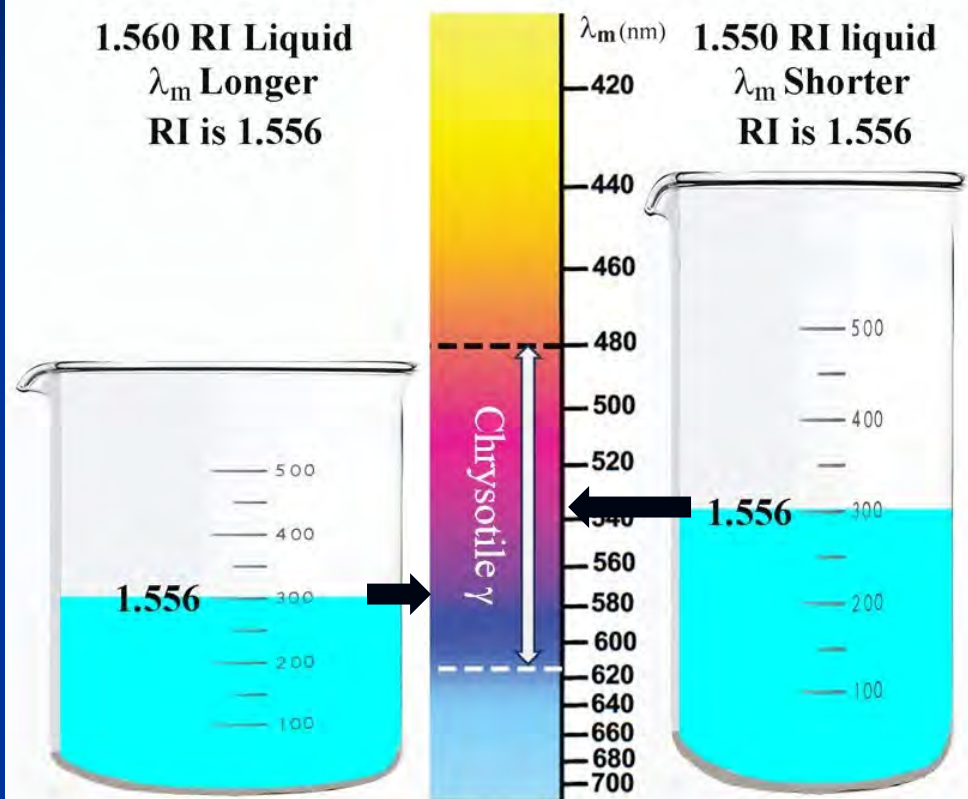
Mount the suspected asbestos fibers in an appropriate RI liquid according to Table 4 DRIMMC liquid<sup>(13)</sup> or 5 Cargille liquid<sup>(14)</sup>, which lists two cases: (1) for regulatory, legal, forensic, etc., which requires higher accuracy, and (2) for routine commercial analysis with less stringent accuracy requirements. For high accuracy measurement such as regulatory, legal and forensic analysis, etc., the rule of thumb is to choose RI liquids as close as possible to the RI's to be measured. For example, there are chrysotile minerals whose RIs are significantly higher than those of the standard chrysotile from the NIST SRM 1866 set. In that case, 1.555 or 1.560, instead of 1.550, RI liquids should be used to determine  $\gamma$  (Table 4). When efficiency is a priority and the accuracy requirement is less stringent, choose an RI liquid higher than  $\alpha$  and lower than  $\gamma$  so that the two RI's can be determined in a single preparation.

In 2022, I published a paper on the application of the dispersion staining technique to asbestos analysis. I recommended the use of 1.560 RI liquid for measuring the  $\gamma$  of Calidria chrysotile to improve the accuracy of measurement.

The only purpose of switching from 1.550 to 1.560 is to improve the accuracy of RI measurement because chrysotile's RI is a constant and does not change with the surrounding liquid medium.

The right diagram shows two beakers, the left one is fatter, representing 1.560 liquid, and the right one is thinner, representing 1.550 liquid. The volume of water represents the  $\gamma$  refractive index.

When the same mineral is measured in two different RI liquids, its RI remains the same, but the matching wavelength  $\lambda_m$  changes accordingly: the lower liquid produces a shorter  $\lambda_m$  and the higher liquid produces a longer  $\lambda_m$ .



The right diagram shows two beakers, the left one is fatter, representing 1.560 liquid, and the right one is thinner, representing 1.550 liquid. The volume of water represents the  $\gamma$  refractive index. The 300 milliliters of water volume –  $\gamma$  value – didn't change, but the water level –  $\lambda_m$  – did from a shorter (upper) matching wavelength to a longer (lower) matching wavelength.



# Dr. Longo Misunderstood the RI Liquid's Effect on Minerals' RI

M71614-M71643-M71740 J&J Baby Powders

Date	MAS No.			$\gamma$		$\alpha$	
				Low	High	Low	High
2023-02-28	M71614	001	1	1.564	1.564	1.561	1.561
			2	1.565	1.565	1.561	1.561
			3	1.568	1.568	1.557	1.560
			4	1.565	1.568	1.560	1.564
2023-10-19	M71643	001	1	1.566	1.566	1.561	1.561
			2	1.566	1.569	1.557	1.561
			3	1.561	1.561	1.552	1.552
			4	1.568	1.568	1.559	1.559
2024-02-15	M71740	001	1	1.564	1.564	1.560	1.560
			2	1.564	1.564	1.560	1.560
			3	1.565	1.565	1.562	1.562
			4	1.563	1.563	1.561	1.561
Average				1.565	1.565	1.559	1.560
Grand Average				1.565		1.560	

In 2022, Dr. Longo switched to 1.560 RI liquid. Without any background in optical crystallography, Dr. Longo mistakenly thought measuring in the 1.560 liquid would increase the fiber's refractive index.

Instead of improving the accuracy of RI measurement, the 1.560 liquid produced a suite of augmented  $\alpha$  and  $\gamma$  values.

The left table summarizes 12 pairs of  $\alpha$  and  $\gamma$  values from M71614, M71643, and M71740.

Were those data credible (they were not), MAS single-handedly discovered a new type of chrysotile, whose refractive index is significantly higher than the Calidria chrysotile as shown in the left table.

Three Types of Chrysotile

Type	$\alpha$	$\gamma$	Birefringence	RI	Source
SRM 1866	1.549	1.556	0.007	Standard	NIST
Calidria	1.555	1.560	0.005	Significantly higher than 1866	NVLAP
New?	1.560*	1.565*	0.005	Significantly higher than Calidria	MAS

\* Average of 12 samples in M71614, M71643, and M71740.

Obviously, there has never been any report of the existence of such a unique type of chrysotile with such peculiar optical properties.

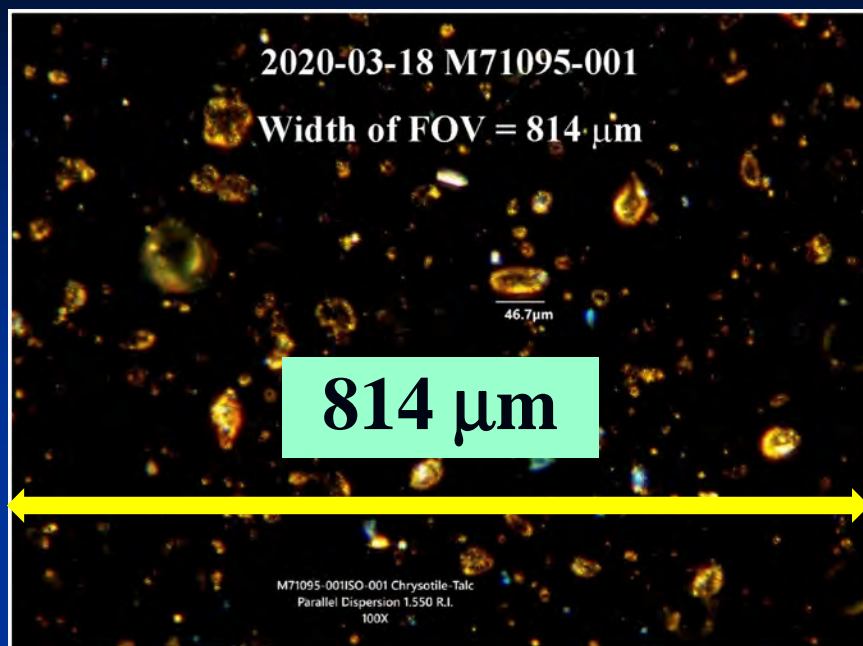
## Incorrect Scale Bars

# MAS's Inability to Create Scale Bars

Date	MAS No.	Chrysotile Length (µm)		
		Individual	Average	vs. Talc
2020-02-24 M70484	001-001	78.8	61.6	Same particle size range as talc
	001-002	33.3		
	001-003	38.5		
	001-004	71.3		
	001-005	62.2		
	001-006	57.0		
	001-007	70.4		
	001-008	49.6		
	002-001	58.5		
	002-002	78.5		
	002-003	79.3		
2020-03-18 M71095	001-001	46.7	32.2	Same particle size range as talc
	001-002	13.3		
	001-003	34.8		
	001-004	34.1		
2020-03-20 M70877	001-001	60.0	37.6	Same particle size range as talc
	001-002	25.9		
	001-003	23.0		
	001-004	41.5		
2021-05-25 M71228	001-001	105.2	55.2	Same particle size range as talc
	001-002	59.5		
	001-003	17.2		
	001-004	38.8		
2022-03-11 M71262	001-001	32.8	32.8	Same particle size range as talc
	001-002	21.6		
	001-003	26.7		
	001-004	50.0		
2023-03-28 M71614	001-001	6.0	4.9	Same particle size range as talc
	001-002	5.1		
	001-003	3.9		
	001-004	4.8		
2023-10-19 M71643	001-001	3.9	3.8	Same particle size range as talc
	001-002	6.6		
	001-003	2.2		
	001-004	2.7		
2024-02-15 M71740	001-001	3.6	8.5	Same particle size range as talc
	001-002	9.4		
	001-003	12.0		
	001-004	8.9		

**Drastic variation of “chrysotile” particle size demonstrates continued inaccuracies in measuring particle sizes.**

# MAS's Inability to Create Scale Bars



The width of the field of view (FOV) can be calculated from the scale bar length or the width of an object.

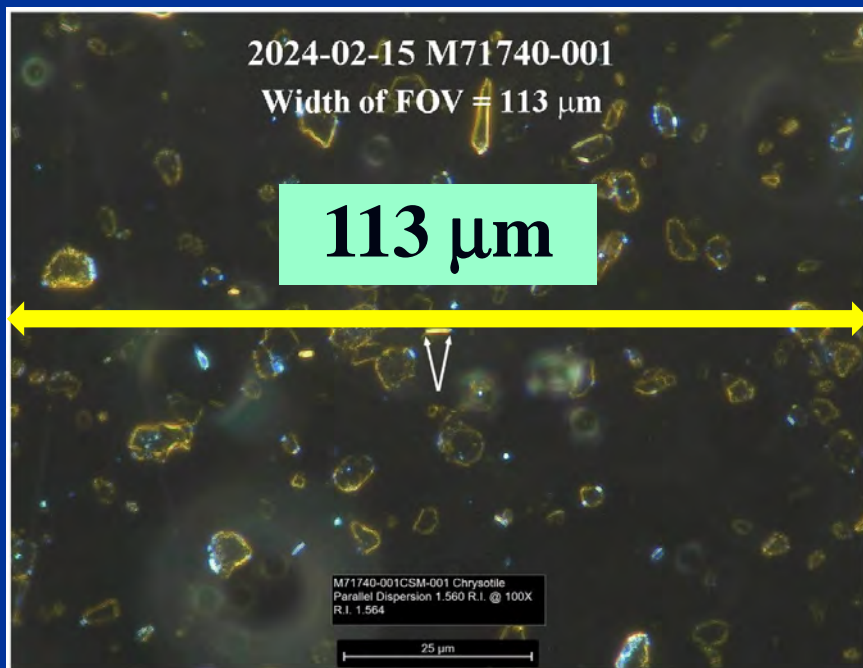
Back on 2020-03-18, the **814  $\mu\text{m}$**  FOV width was wrong.

Five years later, the mistake remained uncorrected. 2024-02-15 still reported a grossly wrong FOV width of **113  $\mu\text{m}$** .

Regardless of the microscope's make, Olympus Nikon Leitz or Leica, the FOV width for a 10X objective lens is slightly over 1 mm or **1,000  $\mu\text{m}$** .

The only conclusion is that MAS is **NOT** capable of correctly performing the most fundamental operation procedure of PLM.

What is important is that talc particle sizes in these two micrographs are the same.



## **Incorrect Particle Size Analysis Results**



# MAS's Particle Size Analysis Data

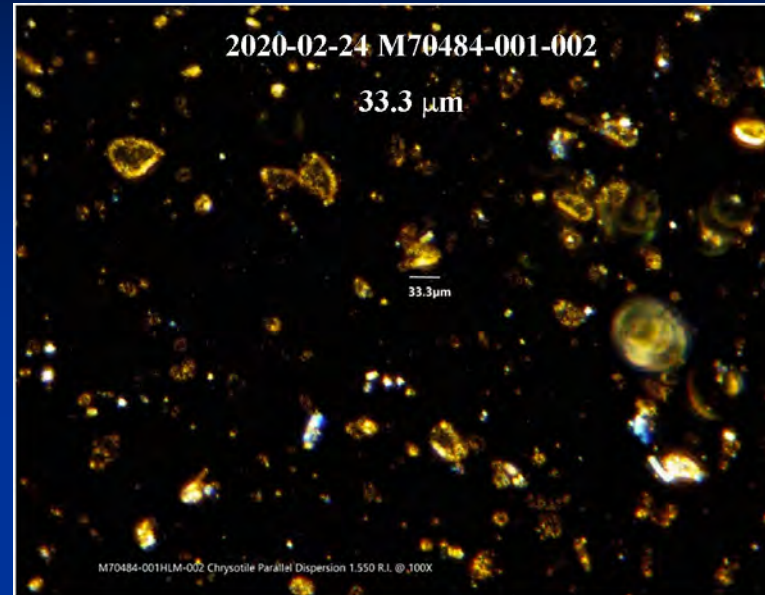
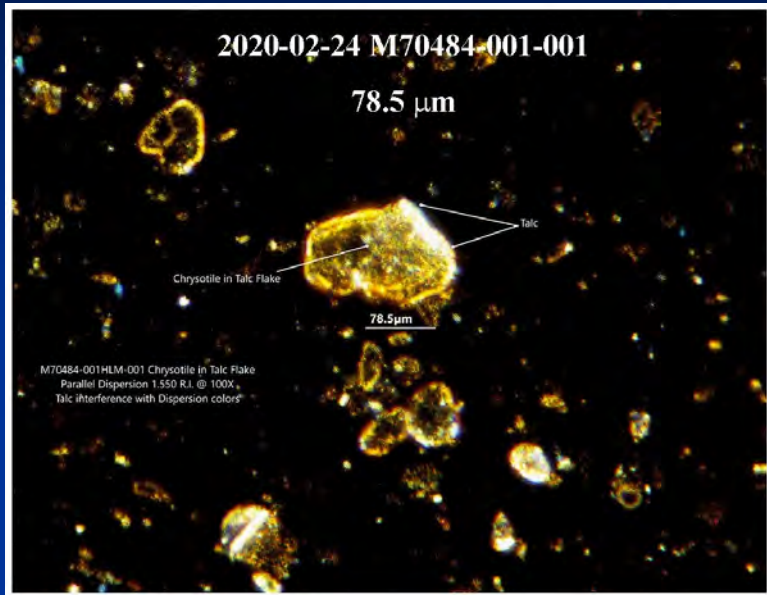
Mineral	Minimum ( $\mu\text{m}$ )	Average ( $\mu\text{m}$ )	Maximum ( $\mu\text{m}$ )	Reference
Talc	1.5	9.3	37.0	MAS (2017)
SG-210 Chrysotile	3.0	8.0	10.0	MAS (2023)

- ♦ MAS's particle size measurements in various reports do not conform to the above data.
- ♦ MAS's data do not conform to the material evidence of USP (2022) and Pier (2017)
- ♦ The maximum length of SG-210 measured by me is hundreds of micrometers, much longer than 10 micrometers by MAS.

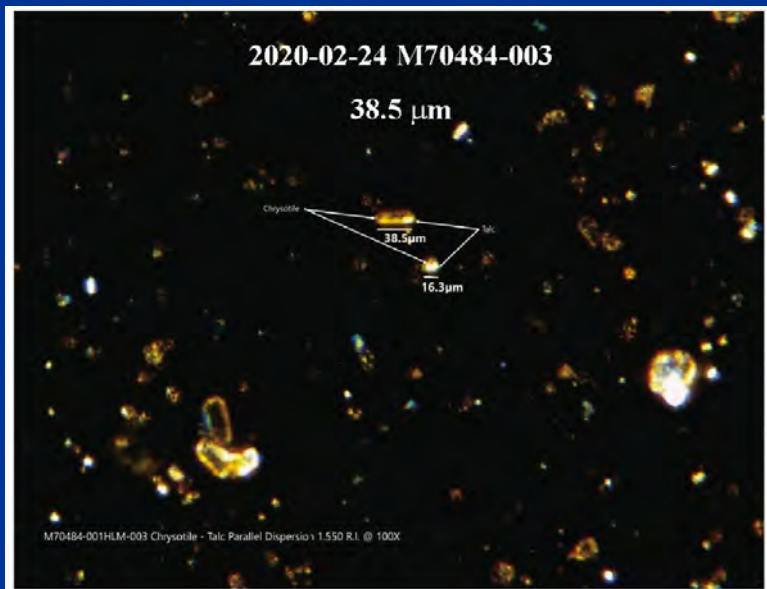
Case 3:16-md-02738-MAS-RJS Document 331-2-9 Filed 08/23/24 Page 49 of 170  
Page 252342

# Incorrect Particle Size Measurement Results

## 2020-02-24 MAS Rpt JBP-Zimmerman



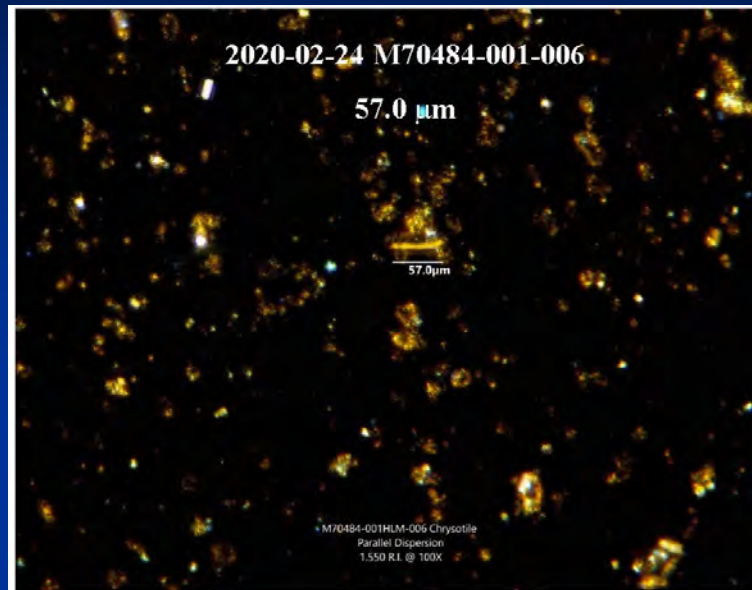
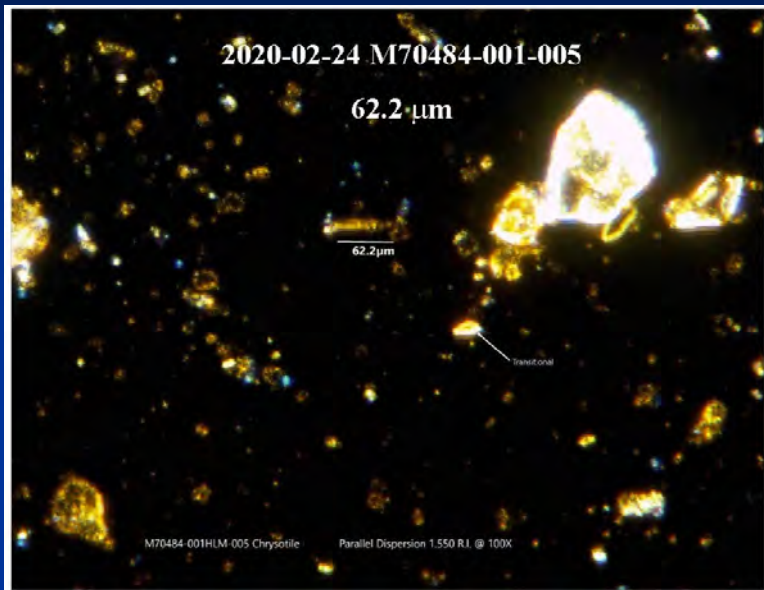
All four  
chrysotile  
particles were  
measured and  
labeled by  
MAS.



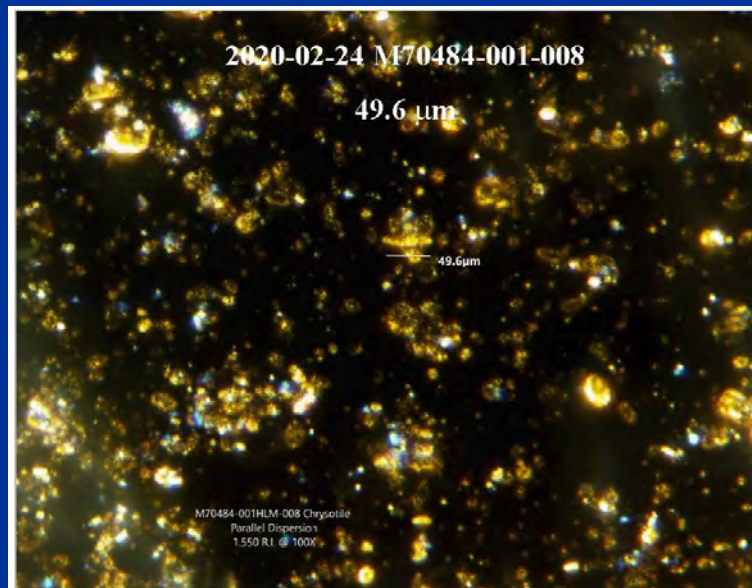
All four  
chrysotile  
particles are  
similar to the  
particle sizes of  
the matrix talc  
particles.



## 2020-02-24 MAS Rpt JBP-Zimmerman



**All four  
chrysotile  
particles were  
measured and  
labeled by  
MAS.**

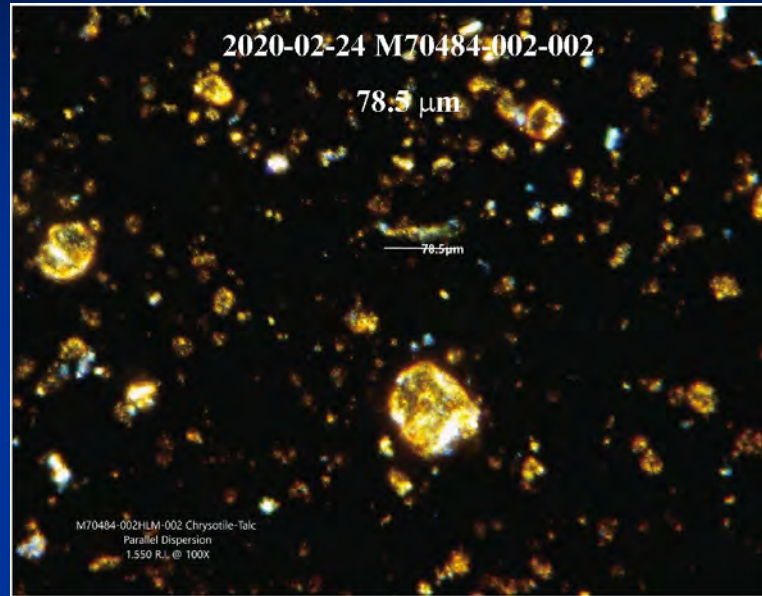
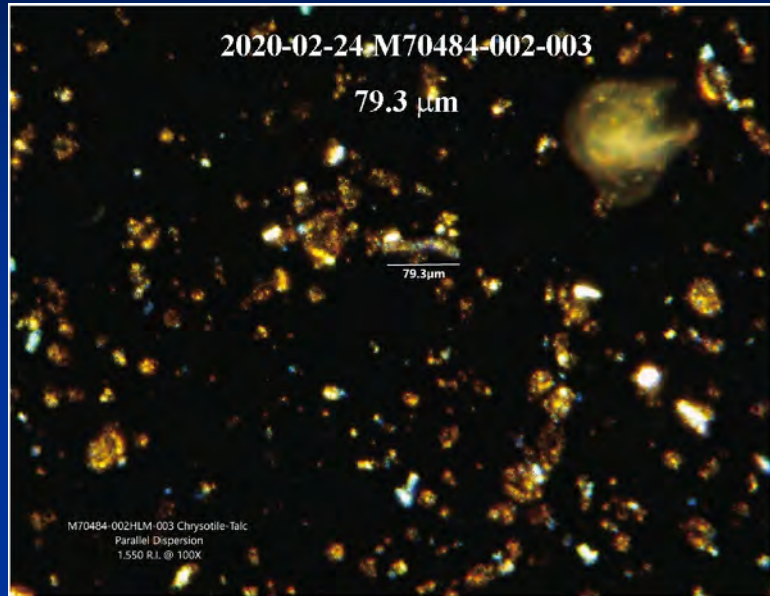


**All four  
chrysotile  
particles are  
similar to the  
particle sizes of  
the matrix talc  
particles.**

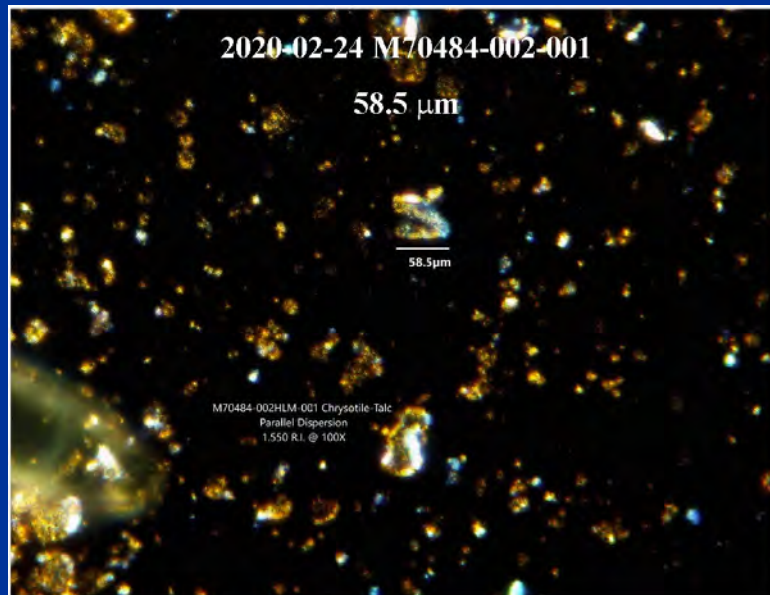
Case 3:16-md-02738-MAS-RJS Document 331-2 Filed 08/23/24 Page 51 of 170  
PageID 252342

# Incorrect Particle Size Measurement Results

## 2020-02-24 MAS Rpt JBP-Zimmerman



**All three  
chrysotile  
particles were  
measured and  
labeled by  
MAS.**

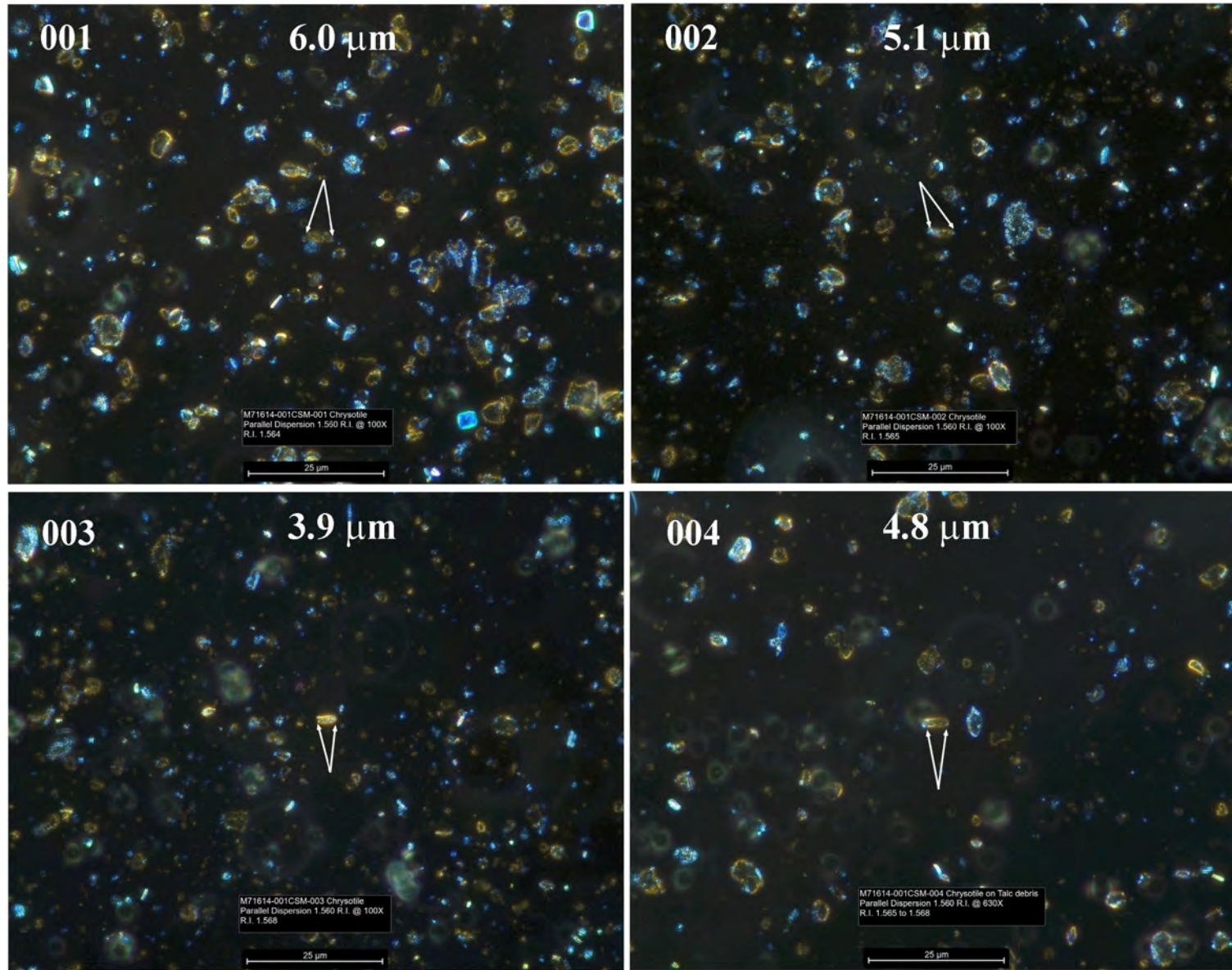


**All four  
chrysotile  
particles are  
similar to the  
particle sizes of  
the matrix talc  
particles.**



## 2023-02-28 M71614 Valdez Bottle Report

### 2023-02-28 MAS 71614 Valdez



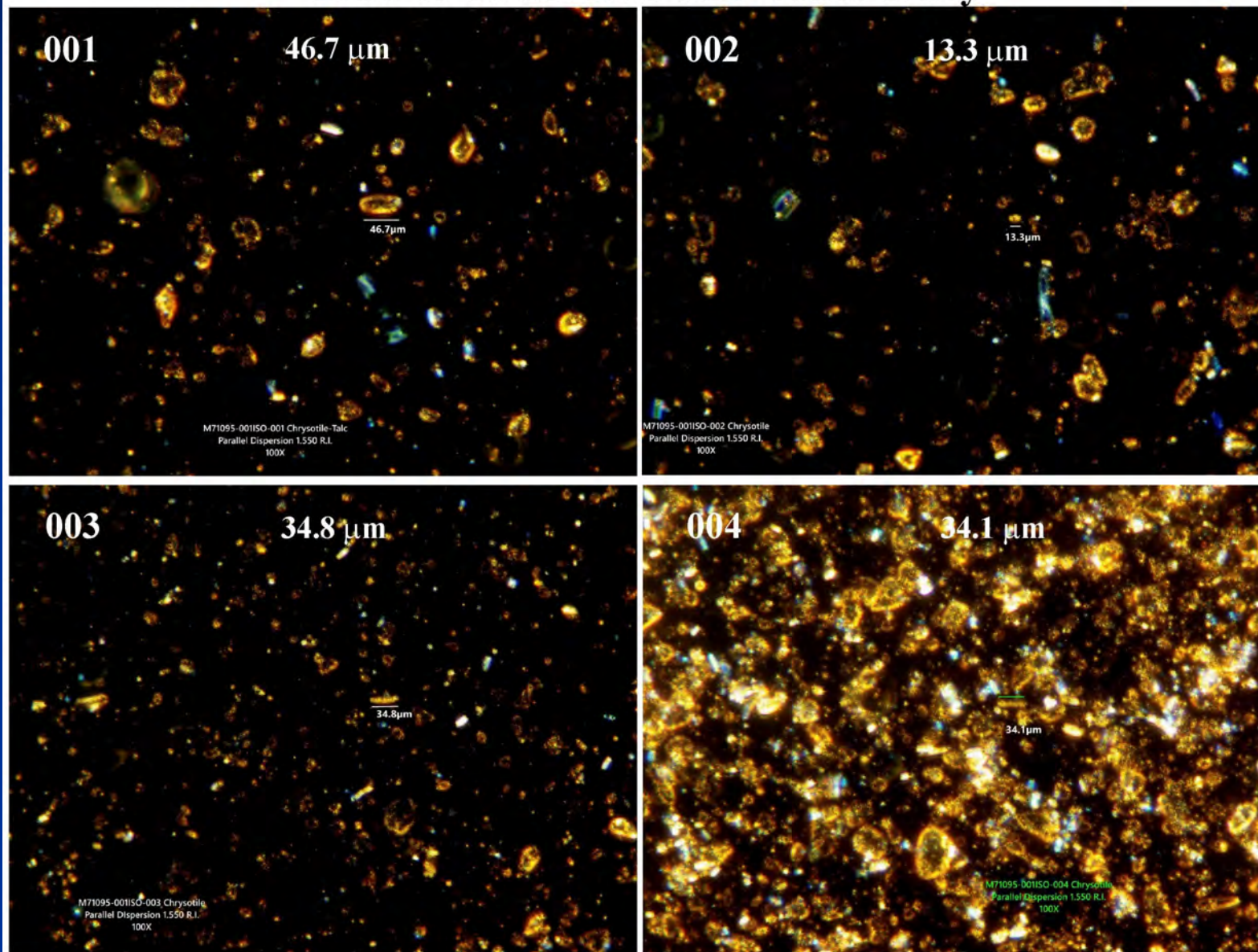
**All four chrysotile particles are under 5 micrometers according to the scale bars.**

**All four chrysotile particles are similar to the particle sizes of the matrix talc particles.**



## 2020-03-18 M71095 Rpt JBP-Titley

### 2020-03-18 M71095-JBP-Janet Titley

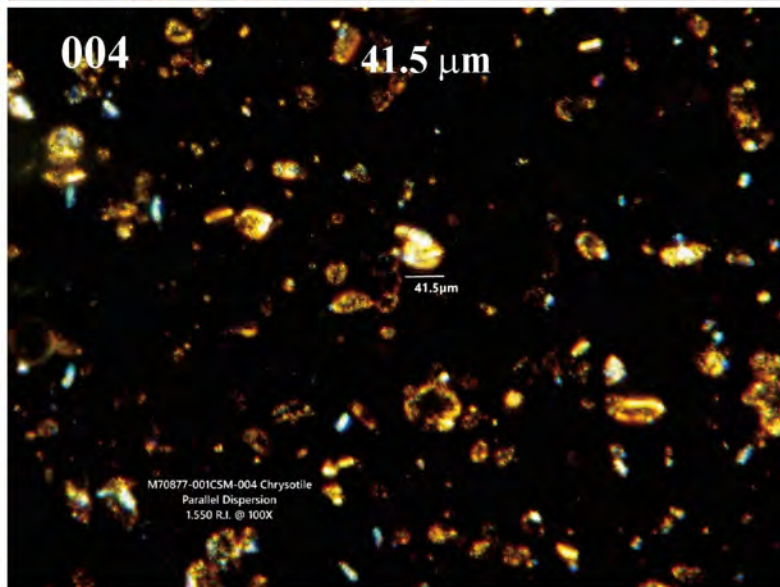
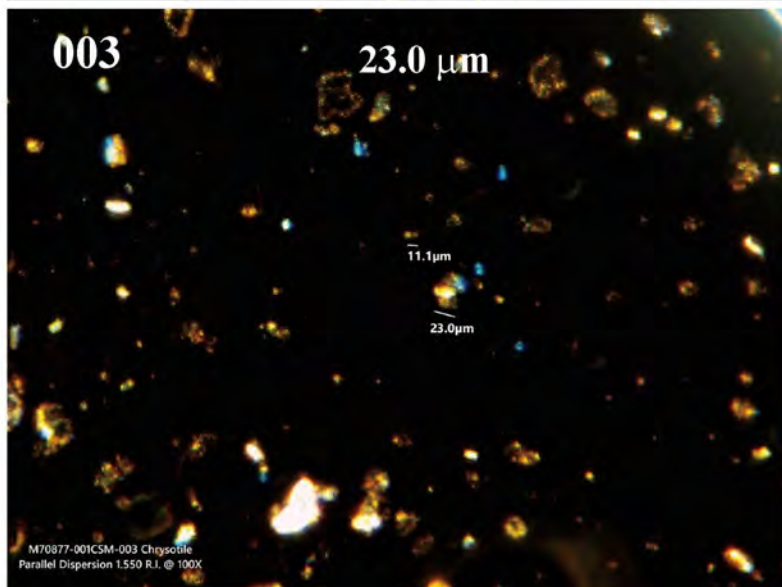
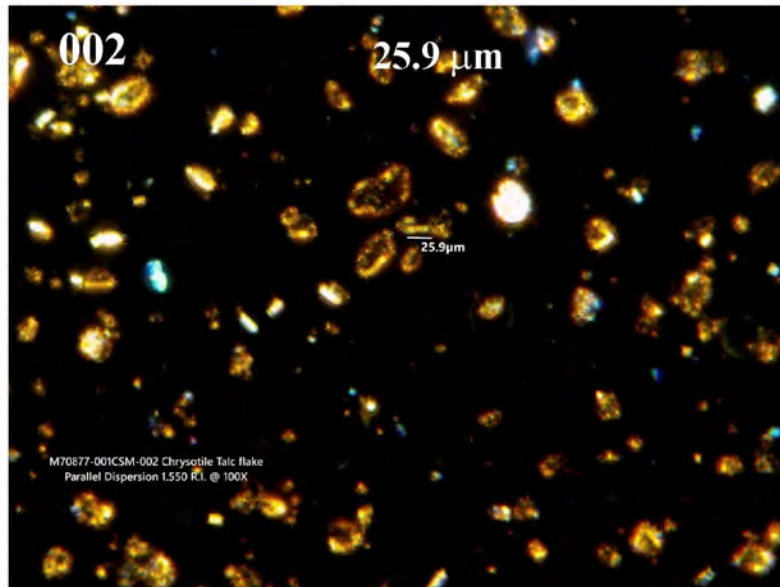
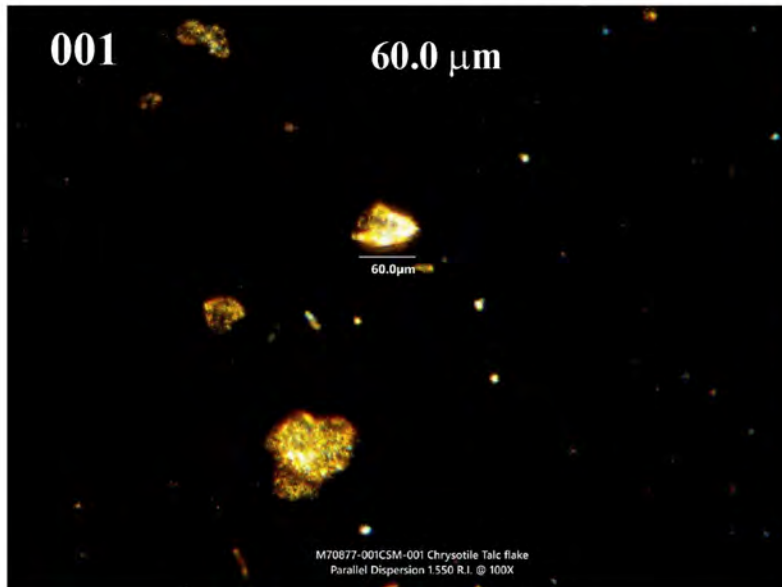


The talc and chrysotile particle sizes of all four samples are much greater than MAS's own data from their SEM analysis.

All four chrysotile particles are similar to the particle sizes of the matrix talc particles.

## 2020-03-20 M70877 Rpt JBP-Doyle

### 2020-03-20 M70877-JBP-Doyle



The talc and chrysotile particle sizes of all four samples are much greater than MAS's own data from their SEM analysis.

All four chrysotile particles are similar to the particle sizes of the matrix talc particles.

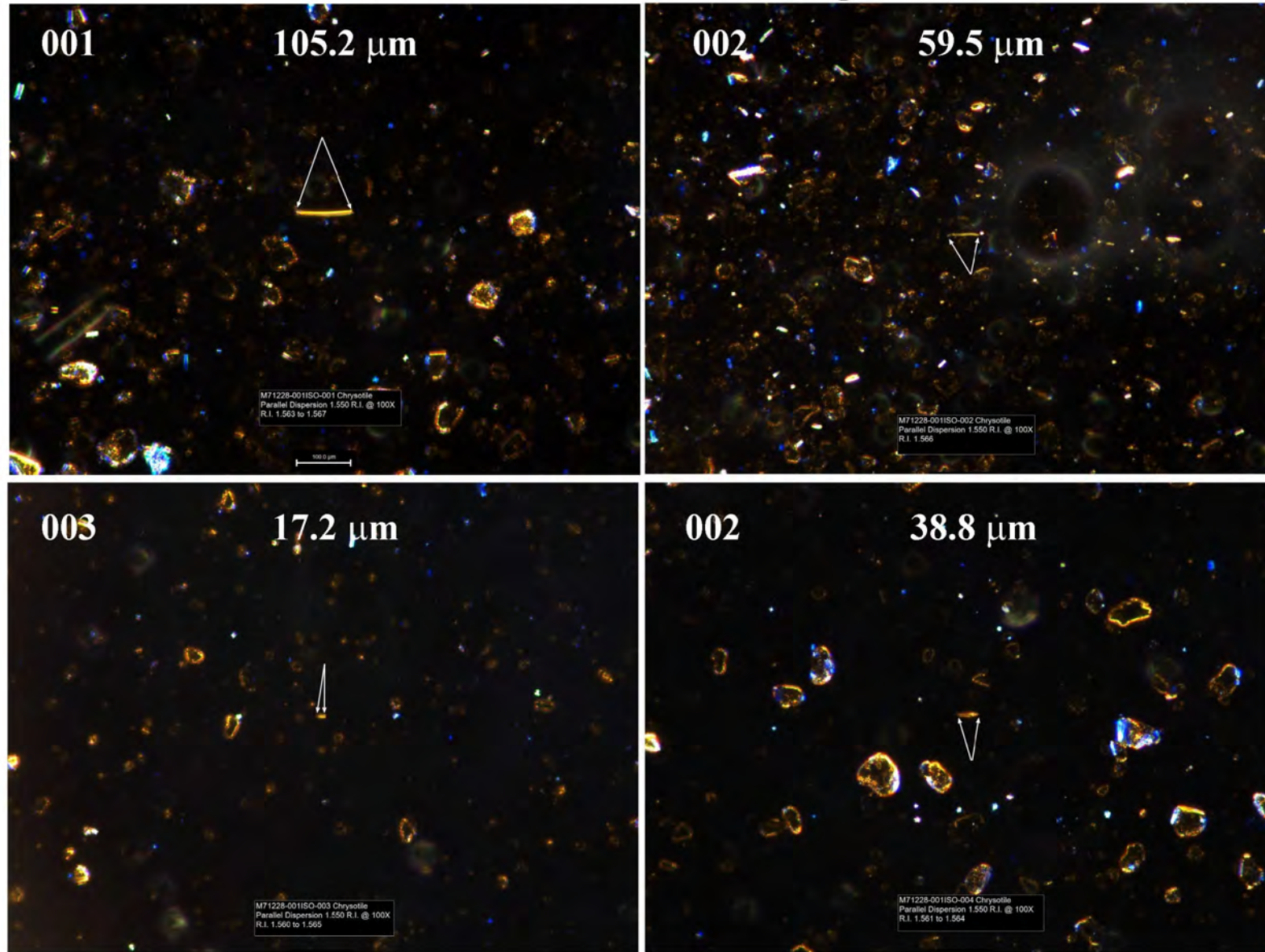


Case 3:16-md-02738-MAS-RJS Document 33-1 Filed 08/23/24 Page 55 of 170  
PageID 252346

# Incorrect Particle Size Measurement Results

## 2021-05-25 M71228 OTShelf JBP Purchased Argentina

2021-05-25 M71228-JBP-Argentina

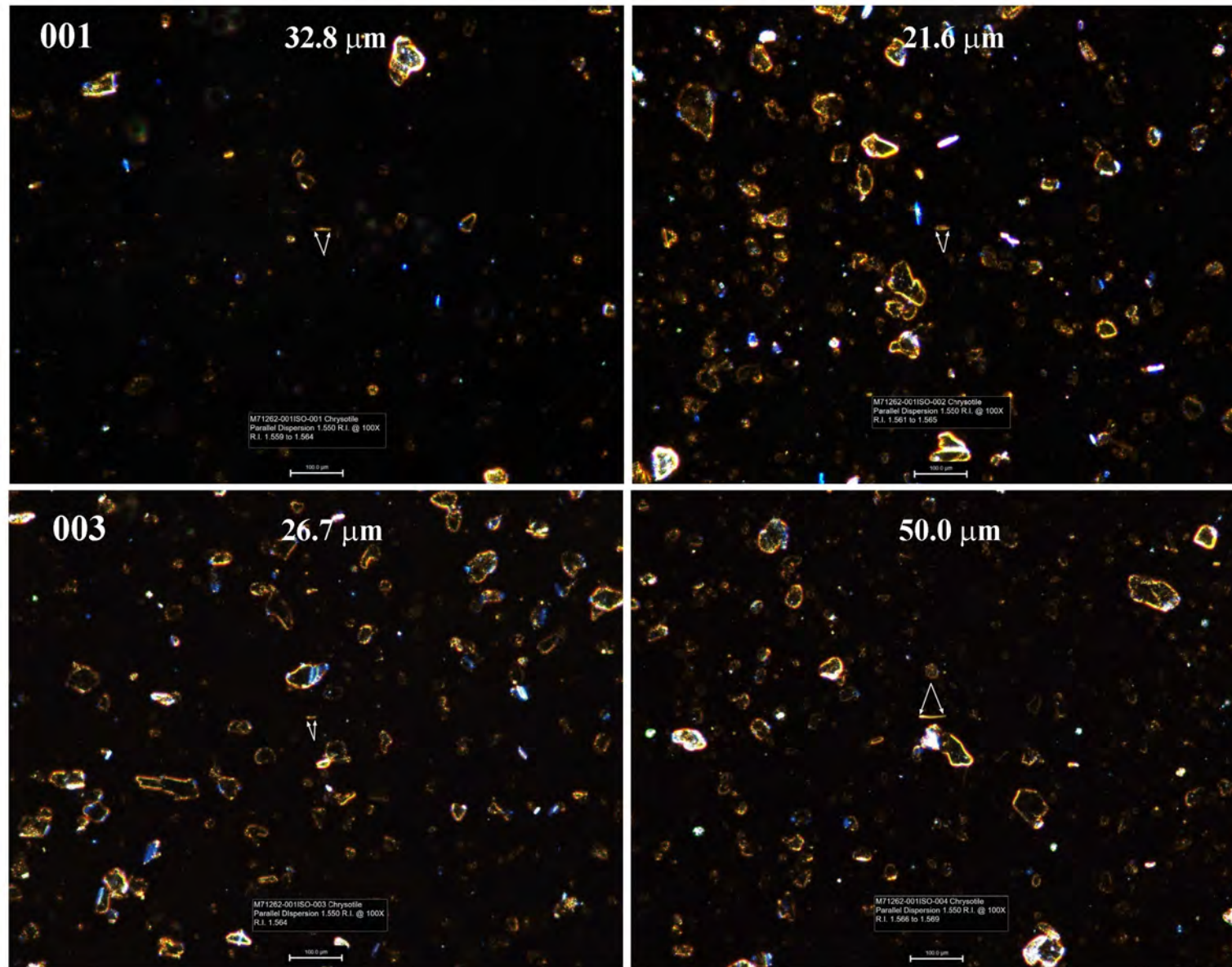


The talc and chrysotile particle sizes of all four samples are much greater than MAS's own data from their SEM analysis.

All four chrysotile particles are similar to the particle sizes of the matrix talc particles.

## 2022-03-11 M71262 Analy of Klayman's JBP & STS Containers

2022-03-11 M71262-Klaman JBP&STS



The talc and chrysotile particle sizes of all four samples are much greater than MAS's own data from their SEM analysis.

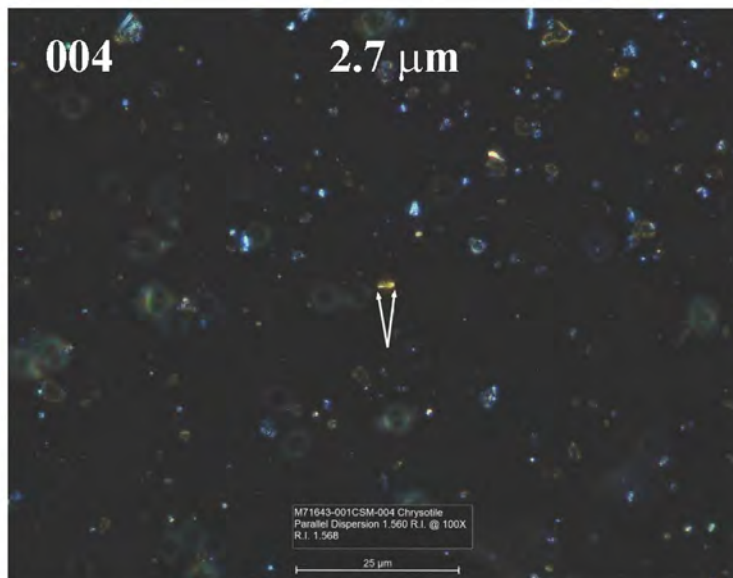
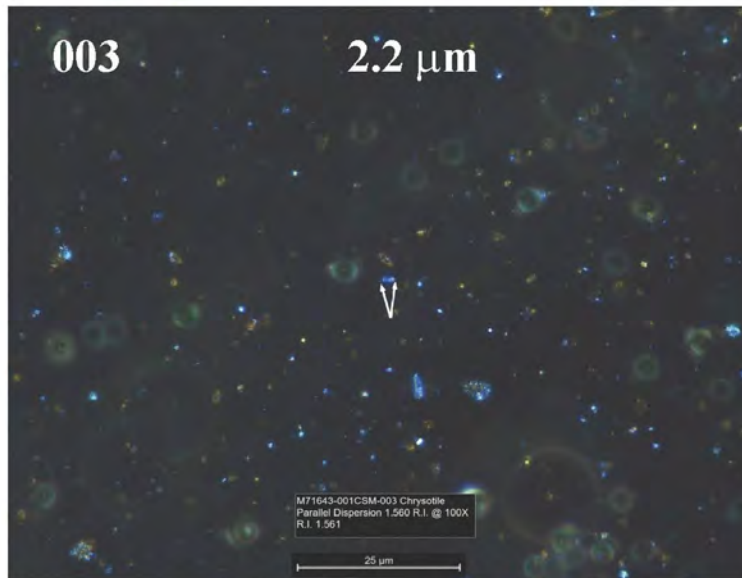
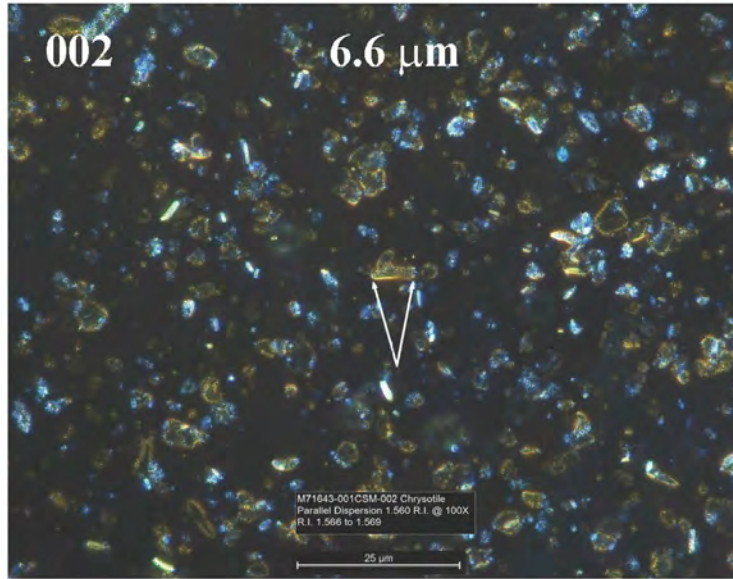
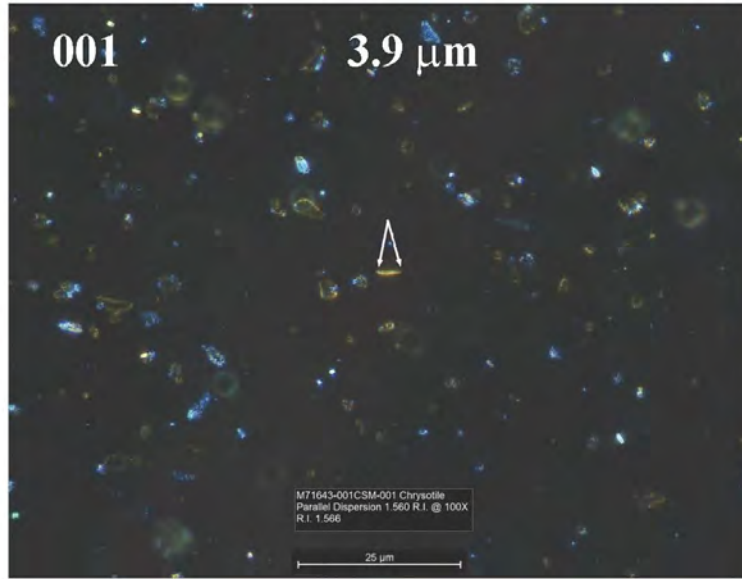
All four chrysotile particles are similar to the particle sizes of the matrix talc particles.



# Incorrect Particle Size Measurement Results

## 2023-10-19 M71643 Johnson's Baby Powder Compiled Notebook 14-2996

### 2023-10-19 M71643 Johnson's Baby Powder Compiled Notebook 14-2996

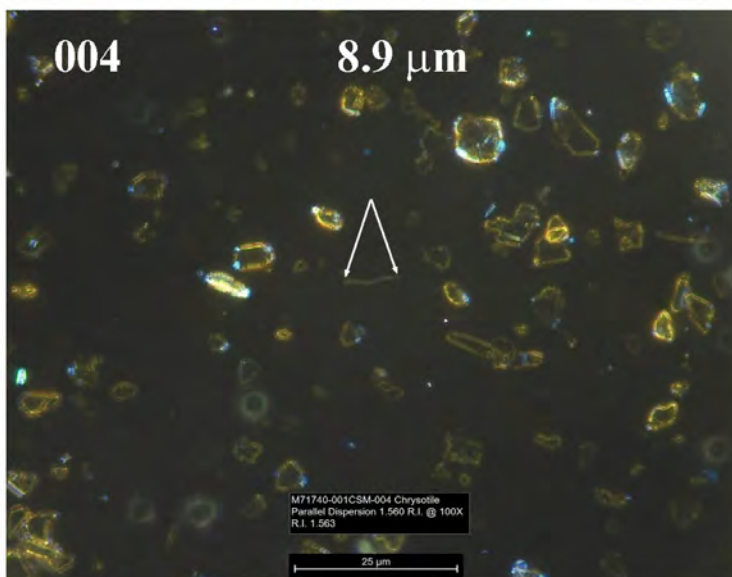
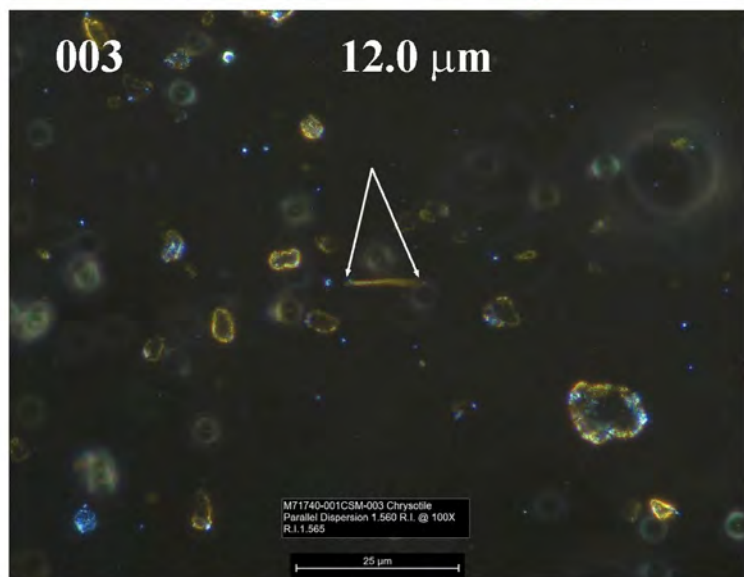
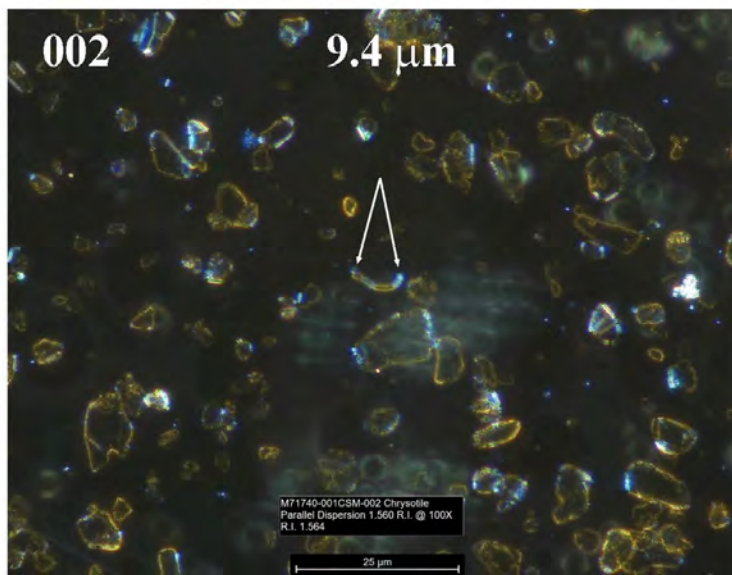
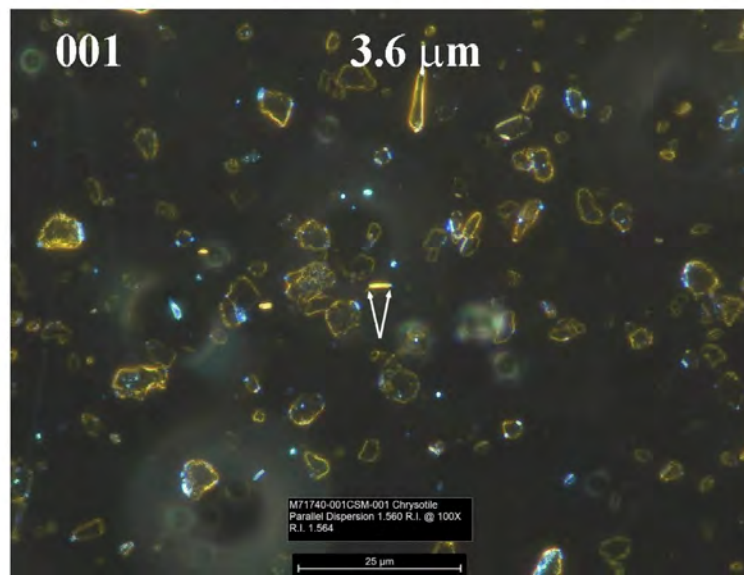


**All four  
chrysotile  
particles are  
under 5  
micrometers  
according to  
the scale bars.**

**All four  
chrysotile  
particles are  
similar to the  
particle sizes of  
the matrix talc  
particles.**

## 2024-02-15 M71740 Analysis of JBP (Rochelle Kirch) Compiled Notebook

### 2024-02-15 M71740 Analysis of JBP (Rochelle Kirch) Compiled Notebook



The particle sizes of four chrysotile particles do not conform to MAS's SG-210 Calidria data (2023).

All four chrysotile particles are similar to the particle sizes of the matrix talc particles.



# Summary of Eight Particle Size Measurement Results

Case 3:16-md-02738-MAS-PJS Document 3-22-3 Filed 08/23/24 Page 59 of 170  
PageID: 252351

Date	MAS No.	Chrysotile Length (µm)		
		Individual	Average	vs. Talc
2020-02-24 M70484	001-001	78.8	61.6	Same particle size range as talc
	001-002	33.3		
	001-003	38.5		
	001-004	71.3		
	001-005	62.2		
	001-006	57.0		
	001-007	70.4		
	001-008	49.6		
	002-001	58.5		
	002-002	78.5		
	002-003	79.3		
2020-03-18 M71095	001-001	46.7	32.2	Same particle size range as talc
	001-002	13.3		
	001-003	34.8		
	001-004	34.1		
2020-03-20 M70877	001-001	60.0	37.6	Same particle size range as talc
	001-002	25.9		
	001-003	23.0		
	001-004	41.5		
2021-05-25 M71228	001-001	105.2	55.2	Same particle size range as talc
	001-002	59.5		
	001-003	17.2		
	001-004	38.8		
2022-03-11 M71262	001-001	32.8	32.8	Same particle size range as talc
	001-002	21.6		
	001-003	26.7		
	001-004	50.0		
2023-03-28 M71614	001-001	6.0	4.9	Same particle size range as talc
	001-002	5.1		
	001-003	3.9		
	001-004	4.8		
2023-10-19 M71643	001-001	3.9	3.8	Same particle size range as talc
	001-002	6.6		
	001-003	2.2		
	001-004	2.7		
2024-02-15 M71740	001-001	3.6	8.5	Same particle size range as talc
	001-002	9.4		
	001-003	12.0		
	001-004	8.9		

Mineral	Minimum (µm)	Average (µm)	Maximum (µm)	Reference
Talc	1.5	9.3	37.0	MAS (2017)
SG-210 Chrysotile	3.0	8.0	10.0	MAS (2023)

The chrysotile particle sizes of the first three samples were measured and labeled by MAS.

The chrysotile particle sizes of the other five samples were measured in reference to MAS's scale bars.

None of them conforms to MAS's data in the above table.

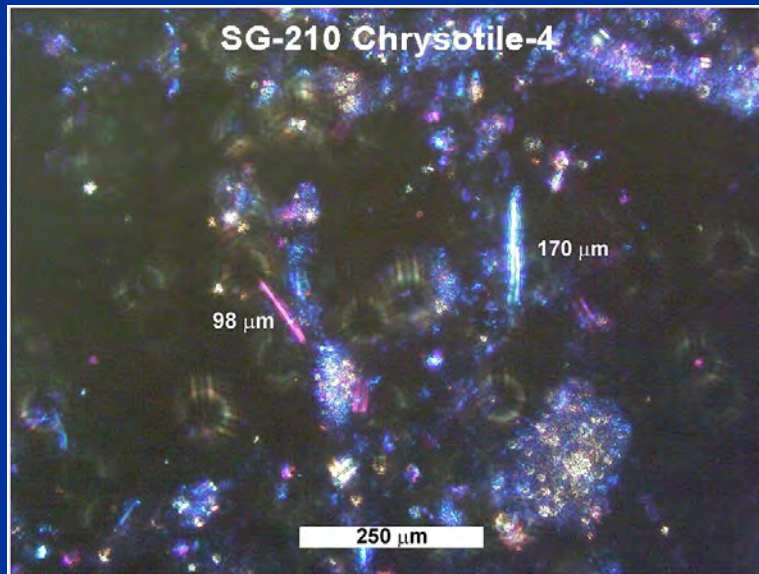
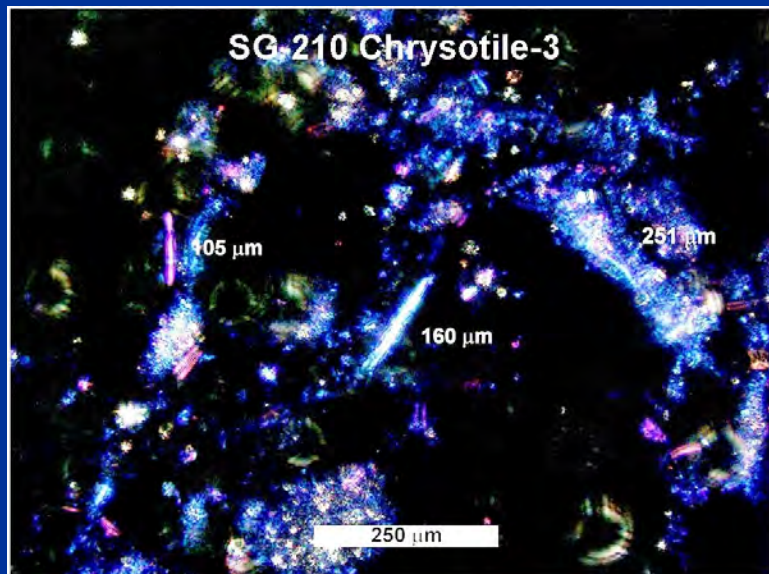
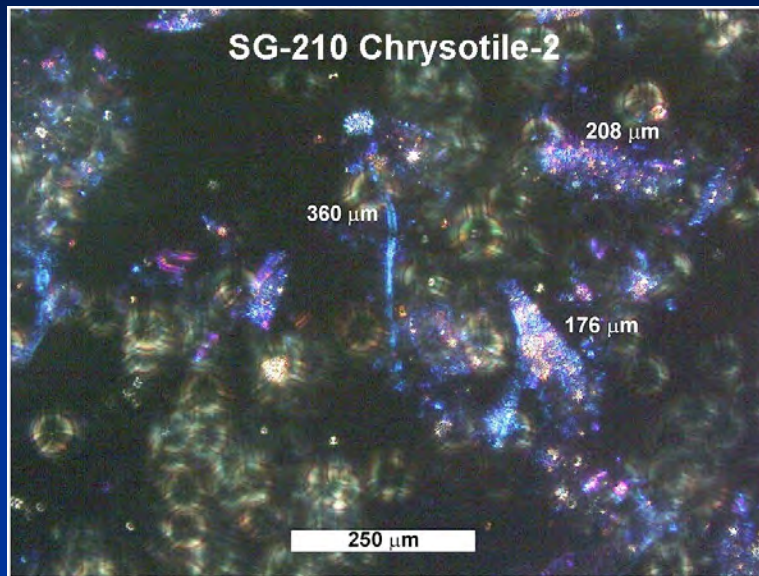
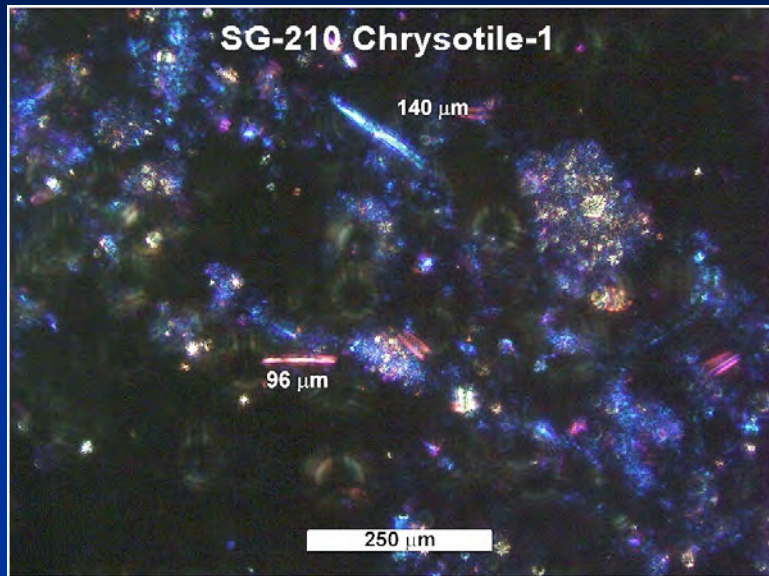
The particle size range of every chrysotile particle is the same as the matrix talc particles.

There is a great degree of inconsistency in "chrysotile" particle sizes reported by MAS over the last five years.

The only conclusion is that MAS is **NOT** capable of fixing this systematic error because MAS lacks the ability to perform the most fundamental particle size measuring procedure by PLM.

# MAS Misidentified Taic as Chrysotile

## Evidence # 2 – Particle Size



**These four images show that Calidria chrysotile structure lengths could be hundreds of micrometers much longer than the 37 micrometers of the SG-210 maximum length reported by MAS.**



# Tensile Strength of Chrysotile



## Structural features of natural and acids modified chrysotile nanotubes

Myroslav Sprynskyy<sup>a</sup>  , Janusz Niedojadło<sup>b</sup>,  
Bogusław Buszewski<sup>a</sup>



Chemistry of Solids

Volume 72, Issue 9, September 2011, Pages 1015-1026

### Structural features of natural and acids modified chrysotile nanotubes

They are stronger than steel, highly tolerant of corrosion and much cheaper than synthetic fibers. The measured **tensile strength** of **chrysotile** fibers has been reported in the range 1.1–4.4 GPa [29].

**1.1 to 4.4 GPa or 159,000 – 638,000 Psi**

Sprynskyy, M. et. al. (2011) Structural features of natural and acids modified chrysotile nanotubes. Journal of Physics and Chemistry of Solids. Volume 72, Issue 9. Pages 1015-1026.  
<https://doi.org/10.1016/j.jpcs.2011.05.013>.

They are stronger than steel, highly tolerant of corrosion and much cheaper than synthetic fibers. The measured tensile strength of chrysotile fibers has been reported in the range 1.1-4.4 Gpa.

**Conclusions:** The raw chrysotile is presented by bundles of fibers about 50–10 micrometers in size, which are able to splitting with generation of thinner bundles up to one micrometer. The outer diameters of individual nanotubes vary from 15 to 30 nm, while the inner diameters range from 2 to 6 nm. The single chrysotile fibers are presented by cylindrical nanotubes of various forms: rectilinear cylinders (the most widespread), cylinders with cup-like ends, cylinder-in-cylinder and cone-in-cone tubes.

# Tensile Strength of Talc



Home > Journal of Packaging Technology and Research > Article

**Optimization of Tensile Strength and Shrinkage of Talc-Filled Polypropylene as a Packaging Material in Injection Molding**

Journal of Packaging Technology and Research

Journal of Packaging Technology and Research

Aims and scope →

Submit manuscript →

Research Article  
Published: 23 November 2019  
Volume 4, pages 69–78, (2020)  
[Cite this article](#)

**Abstract**

shrinkage of injection-molded TFPP parts under the same molding condition. With the Taguchi optimization approach, it turned out that the tensile strength was increased from 22.07 to 24.40 MPa and the shrinkage was reduced from 3.25 to 2.28%. The optimizing approach and the

**2.33 MPa or 338 Psi**

Syed, S.F., Chen, J.C. & Guo, G. (2020) Optimization of Tensile Strength and Shrinkage of Talc-Filled Polypropylene as a Packaging Material in Injection Molding. J Package Technol Res 4, 69–78.  
<https://doi.org/10.1007/s41783-019-00077-6>



# Tensile Strength of Hemp Fibers



Fiber	Tensile strength (MPa)	Young's modulus (GPa)	Density (g cm <sup>-3</sup> )	Refs
Cotton	330–585	4.5–12.6	1.5–1.54	119
Flax	345–1035	27.6–45.0	1.43–1.52	119
Hemp	690–1000	50.0	1.47–1.50	119
Jute	393–800	13–26.5	1.3–1.45	82
Silk	650–750	16	1.3–1.38	82
Kenaf	930	53.0	1.5	119
Ramie	400–1000	61.5	1.5–1.6	119
Sisal	511–635	9.4–15.8	1.16–1.5	119
Banana	500–700	7–20	1.4	120
Softwood	100–170	10–50	1.4	120
Hardwood	90–180	10–70	1.4	120
E-glass	1800	69.0–73.0	2.5	119
HM carbon	2400	380	1.95	121,122
HS carbon	3400	230	1.75	121,122
Kevlar 49	3000	130	1.45	121,122

HM: high modulus, HS: high strength.

**690 – 1,000 MPa or 100,050 – 145,000 Psi**

Shubhra, T.H. et. al., (2011). Mechanical properties of polypropylene composites: a review. J Thermoplast Compos. 26. 362-391. <https://doi.org/10.1177/0892705711428659>.

**Hemp fiber's tensile strength is slightly lower than chrysotile**

# Structure of Hemp Fibers

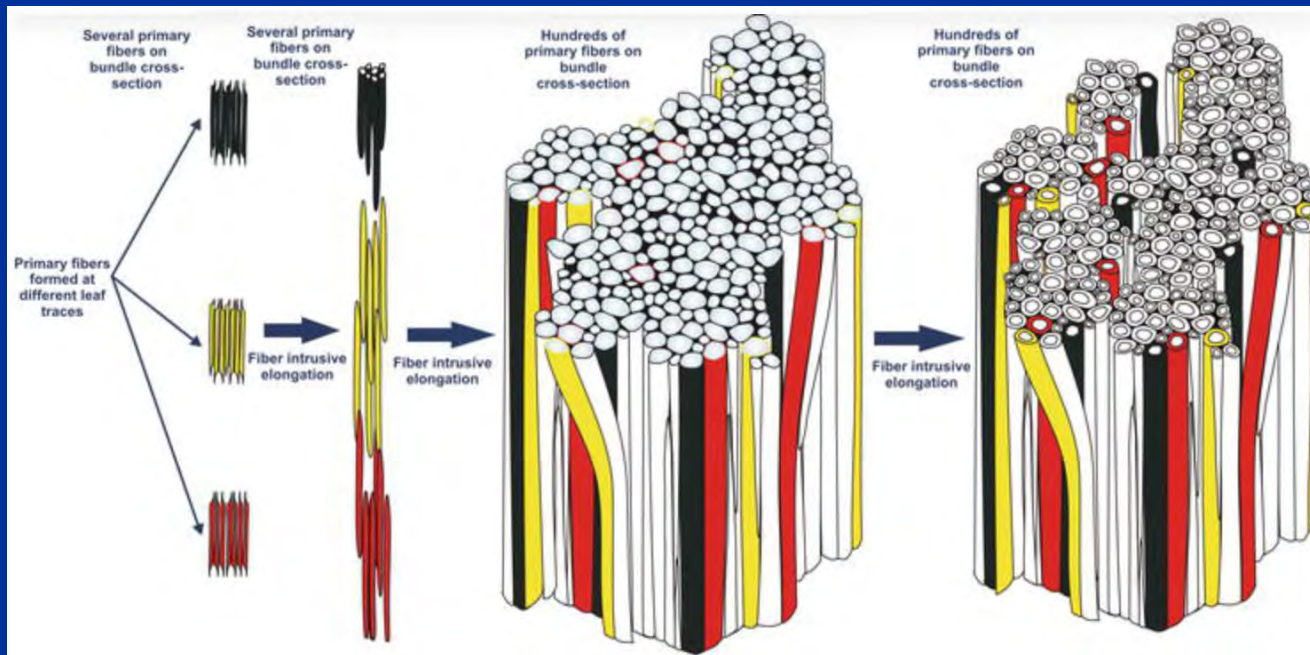


**690 – 1,000 MPa or  
100,050 – 145,000 Psi**

Zhao, S. et. al. (2021) The Physical and Chemical Properties of Hemp Fiber Prepared by Alkaline Pectinase-Xylanase System.

<https://doi.org/10.21203/rs.3.rs-451112/v1>.

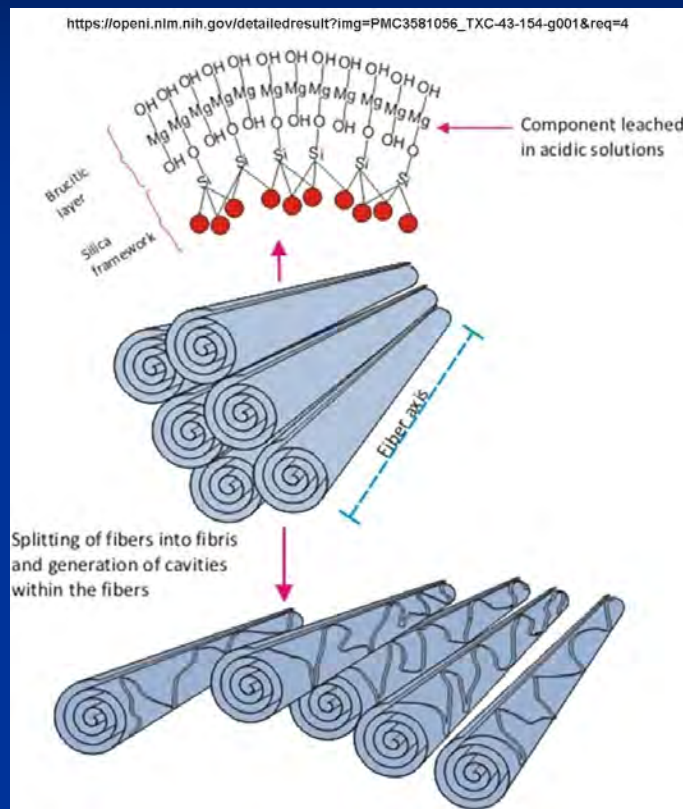
**Hemp fiber's microtube structure  
resembles chrysotile**





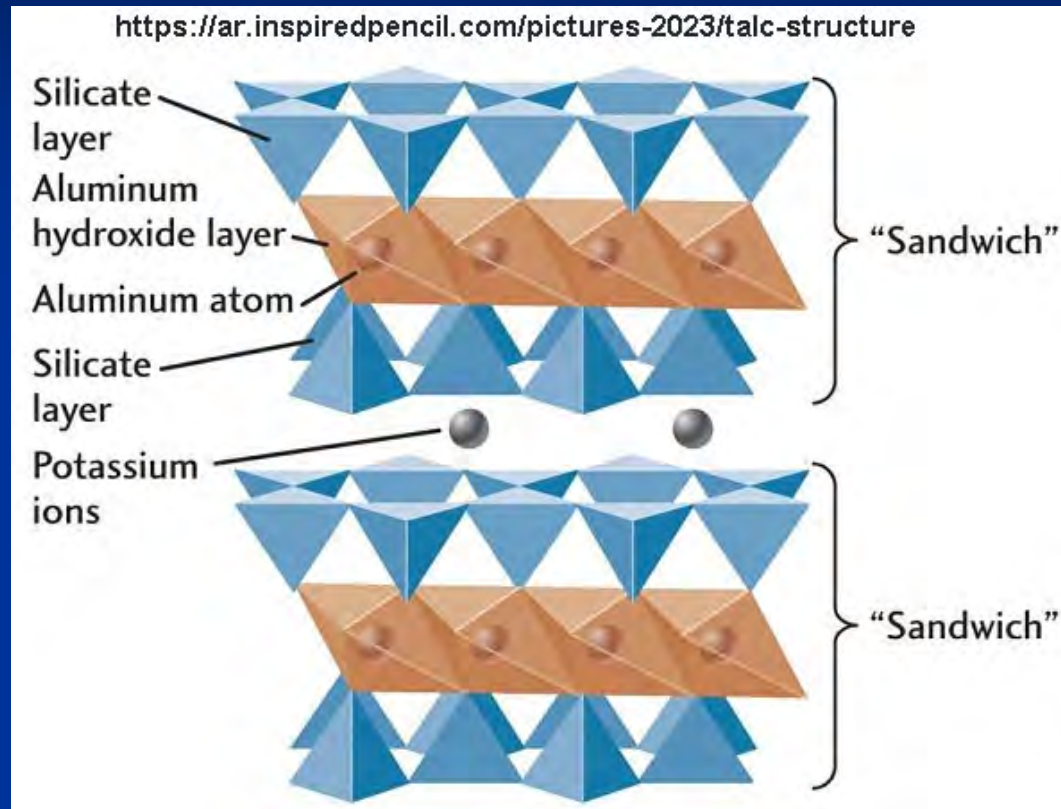
# Chrysotile and Talc Are Drastically Different in Tensile Strength

## Chrysotile $\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4$



The nanotube structure makes the chrysotile even stronger.

## Talc $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$

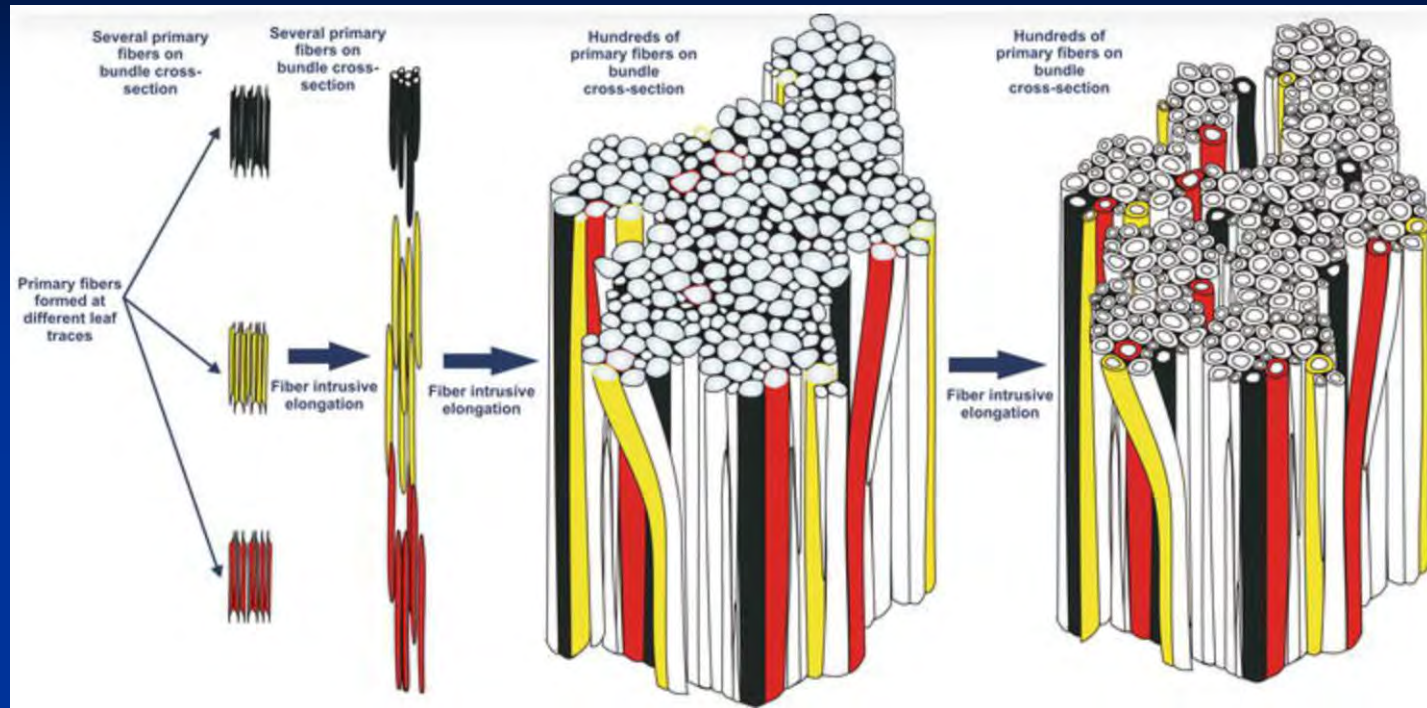
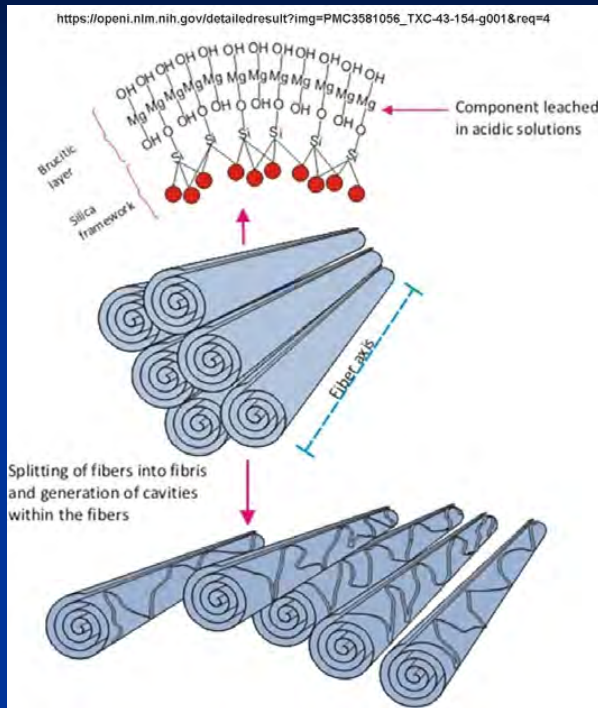


Bonding is weak between and within TOT layers, making talc easily crushable.

Chrysotile’s tensile strength is more than 30 times that of talc. With such a high tensile strength, chrysotile does not break down into 325 mesh-size or  $< 44 \mu\text{m}$  particles in the milling process of talc.

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# Chrysotile and Hemp Fiber Are Similar in Tensile Strength

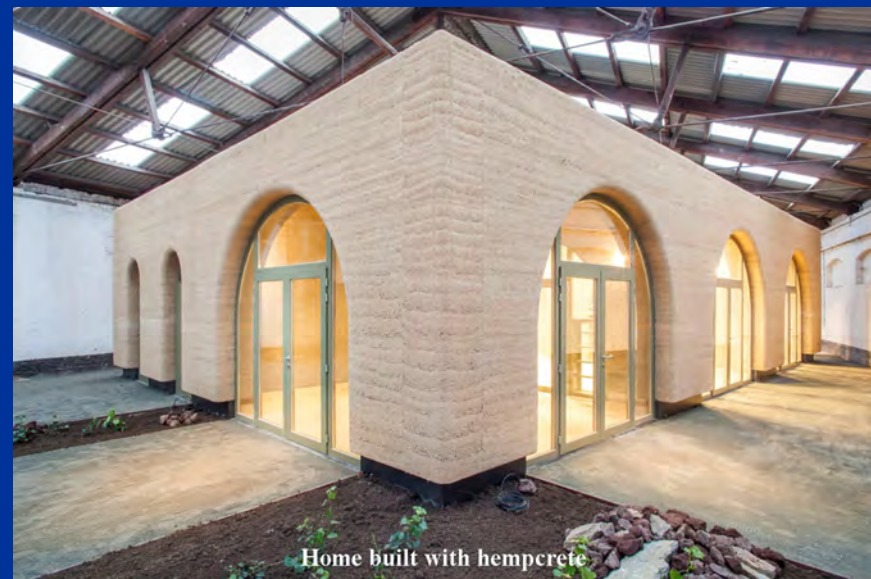
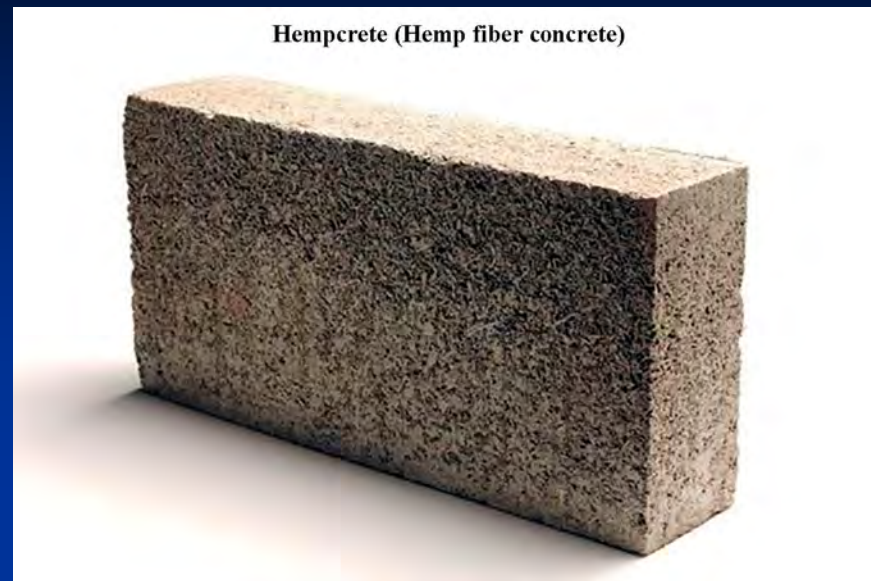


- The hemp's microtube structure is similar to the nanotube structure of chrysotile, making it also very strong.
- Their tensile strengths are similar.
- Both are used as the reinforcement components of composite materials



# How Strong Are Chrysotile and Hemp Fiber?

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**The strong chrysotile fibers are used for various applications.**

**The strong hemp fibers are used for the construction composite materials.**



# How These Materials Behave During Mechanical Grinding?

Case 3:16-md-02738-MAS-PLS Document 331-32-9 Filed 09/23/24 Page 68 of 170  
PageID. 252361



**Their high tensile strength and strong bonding make them hard to break into fine powders.**

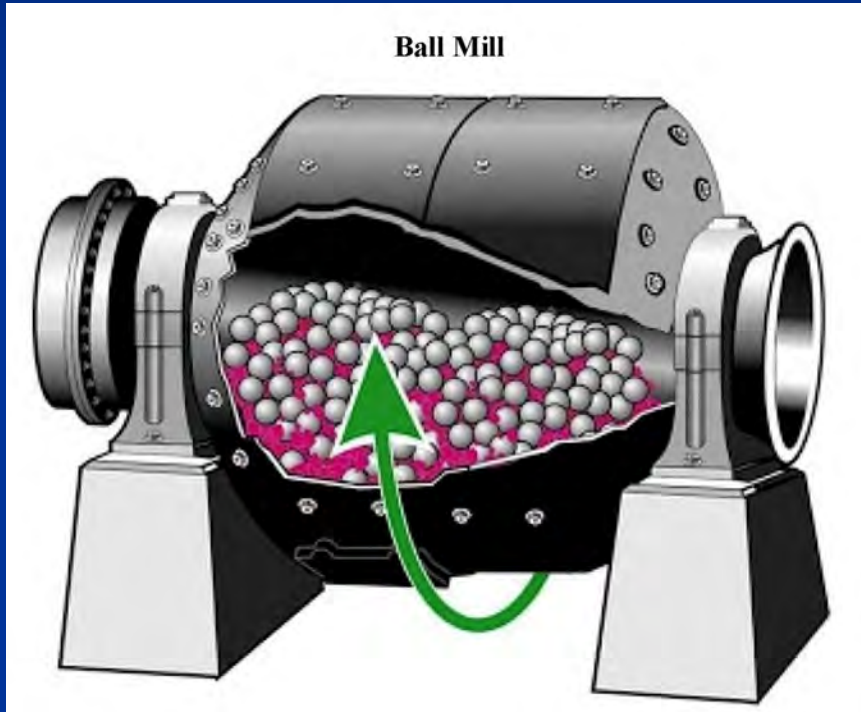
**Their softness and weak bonding make them easily break into fine powders.**



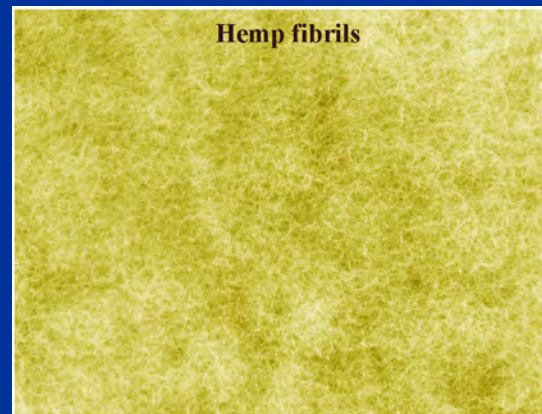
Case 3:16-md-02738-MAS-RLS Document 331-32-9 Filed 08/23/24 Page 69 of 170  
Page ID 252362

# When Crystal Sugar and Hemp Fibers Are Ground Together

**If hemp fibers and sugar crystals are ground together**



**The same is true for talc and chrysotile. USP's research work has proven it.**



**Hemp fibers are crushed and broken into fibrils, but not into fine powders like sugar crystals.**



**Sugar crystals quickly break into fine powders**

**USP's experts have conducted extensive research on the topic of asbestos-containing talc.**

**They wanted to find out how the finished talcum baby powder product should look if the raw talc material contained asbestos.**

**They spiked an asbestos-free talc sample with asbestos minerals chrysotile and tremolite from NIST SRM 1866 at different concentration levels.**

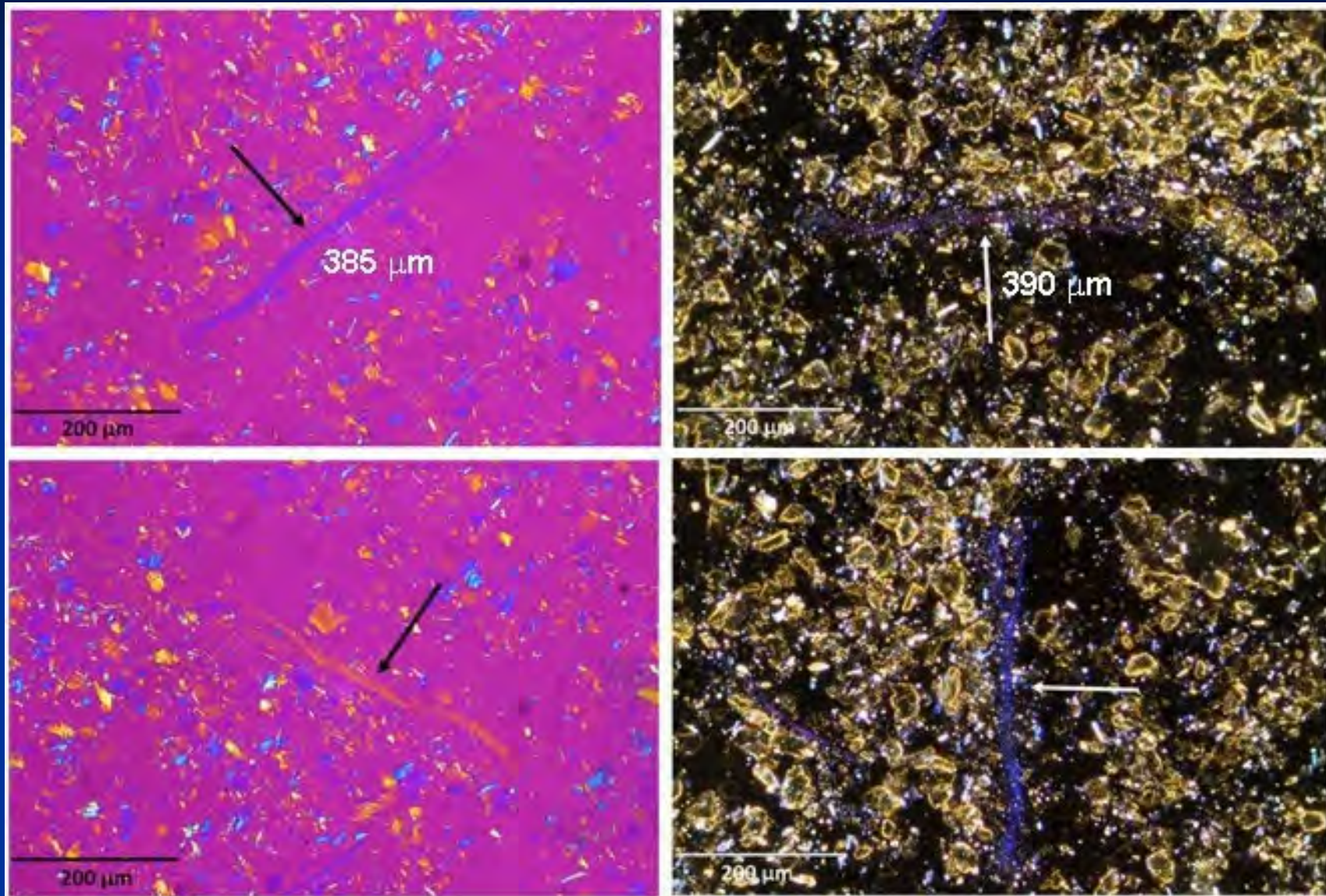
**To mimic the baby powder manufacturing process, they ground the asbestos-spiked talc sample inside a balling mill until the talc's particle size reached the commercial specification of the finished baby powder product: under 44 micrometers.**

**USP's experts studied the finished baby powder samples using various microscopic techniques. The following are pictures taken under optical microscope.**



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# NIST Standard Chrysotile in Talcum Powder (USP, 2022)

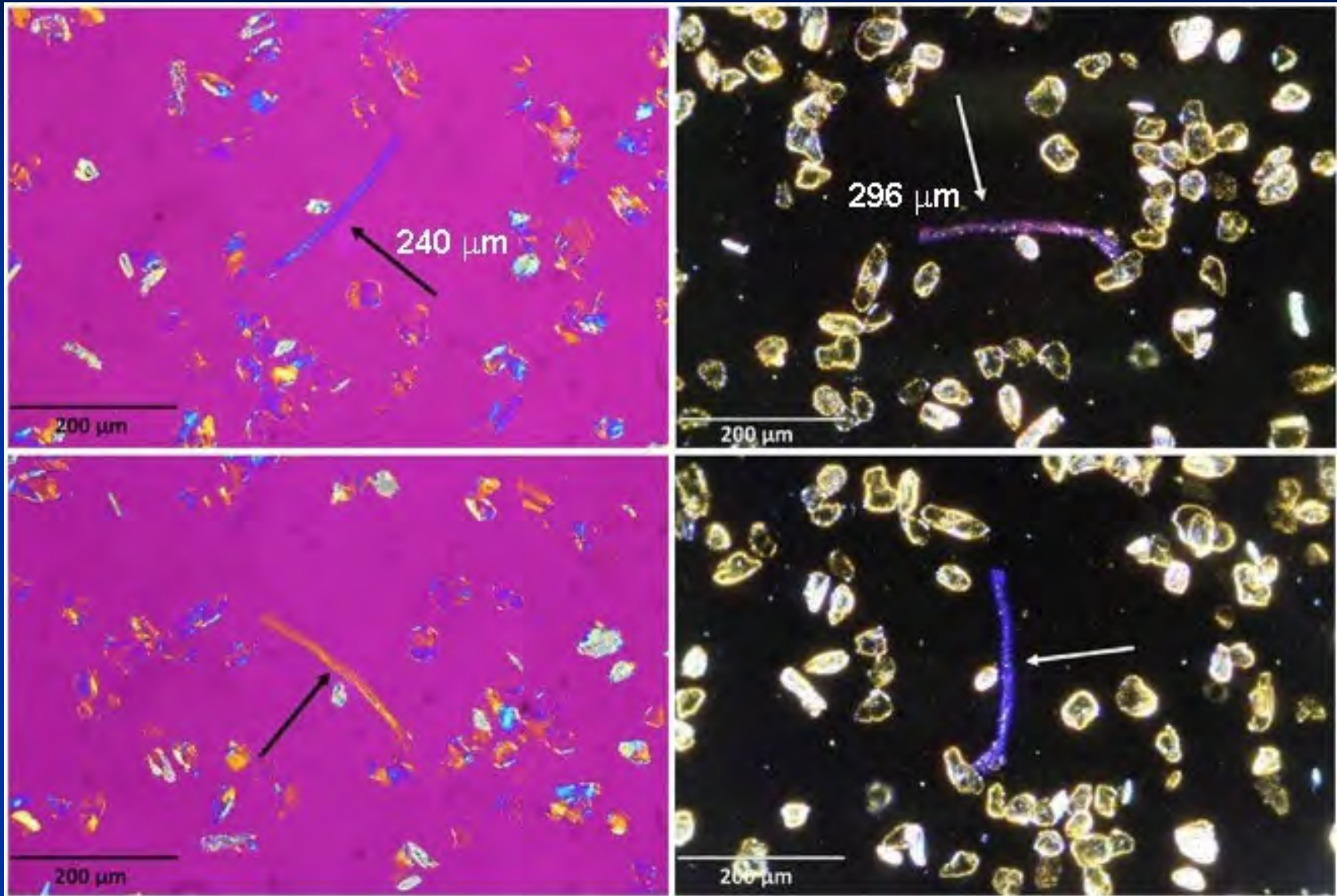


**0.1% standard Chrysotile-spiked talc. Chrysotile fibers' lengths are much longer than talc particles.**



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PageID# 252365

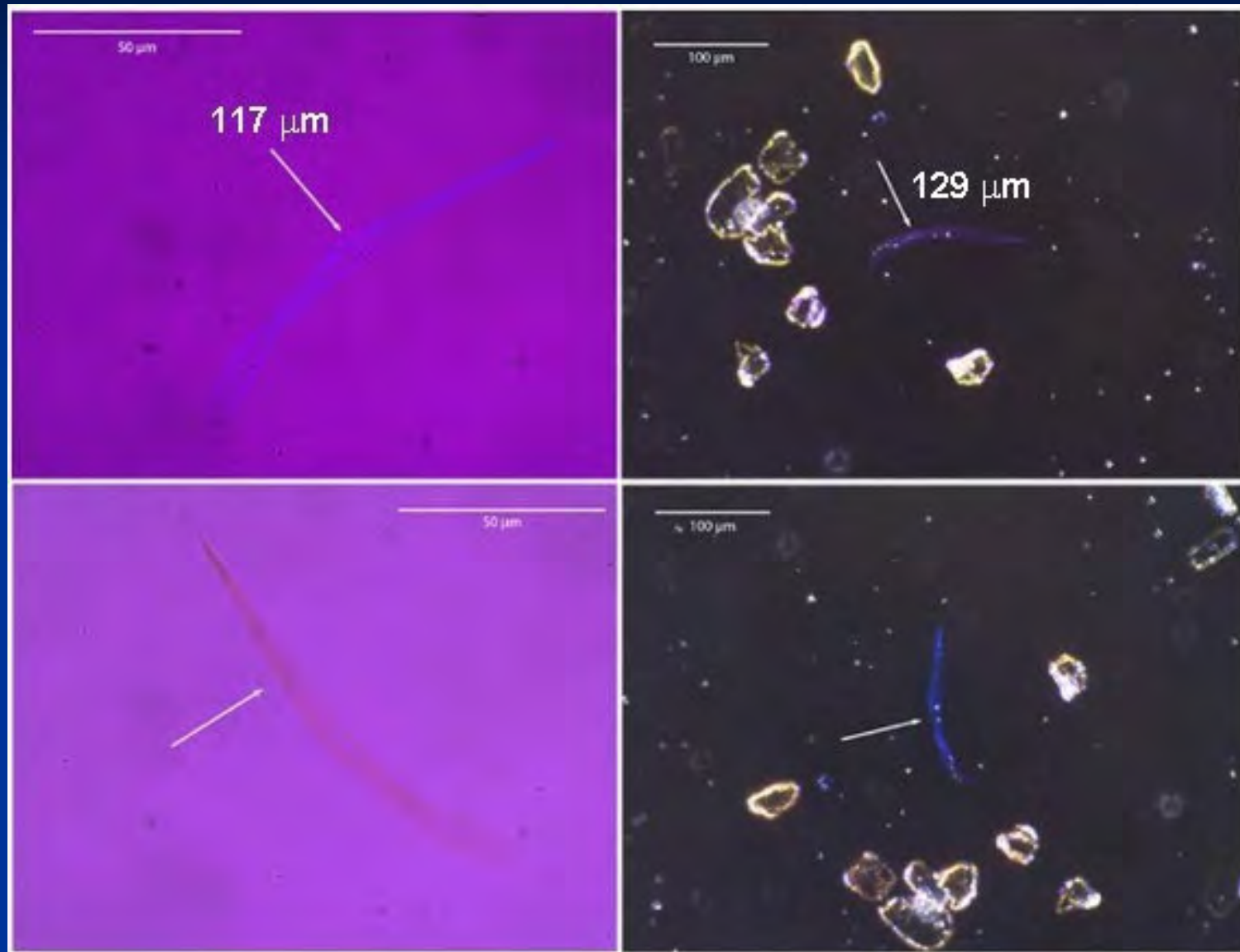
# NIST Standard Chrysotile in Talcum Powder (USP, 2022)



**0.01% standard Chrysotile-spiked talc. Chrysotile fibers' lengths are much longer than talc particles.**

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Page ID 252366

# NIST Standard Chrysotile in Talcum Powder (USP, 2022)



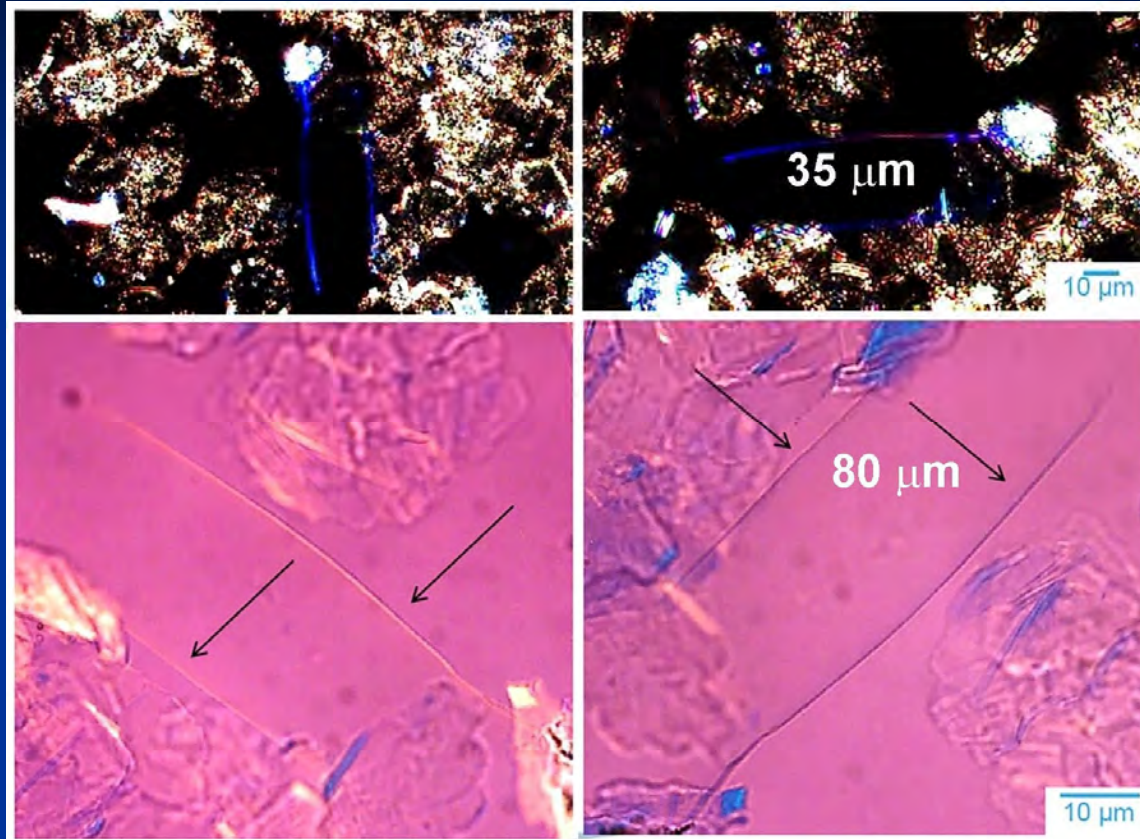
**0.001% standard Chrysotile-spiked talc. Chrysotile fibers' lengths are much longer than talc particles.**



**The above are all NIST standard chrysotile.  
How about Calidria chrysotile?**

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Page 252368

# Calidria Chrysotile in Talcum Powder (Pier, 2017)



**0.05% Calidria chrysotile-spiked talc powder under PLM.**  
**After talc is ground into the baby powder particle sizes (325 mesh or  $< 44 \mu\text{m}$ ),**  
**There are still longer (80 mm) Calidria chrysotile in the sample.**

- The minute amount (e.g. 0.0003 – 0.0006%) of chrysotile found in J&J baby powder products by MAS must have been formed together with talc during the geological formation process. When the raw talc rock ore is used to produce baby powder products, the chrysotile is ground together with talc in balling mills.
- Because of its extremely high tensile strength chrysotile crystals do not break down to the same particle size range as talc crystals. Therefore, the particles of the same size as talc particles cannot be chrysotile.



## **Incorrect Quantification Procedure**

## REMOTE DEPOSITION OF WILLIAM E. LONGO, PhD March 22, 2024

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1 So, okay, well, let's -- and that's why the SG-210 is  
2 so valuable because it's about the same size.

3 So then you take what the recovery is, you  
4 know, and then you can calculate what -- all our  
5 reports will have a weight corrected, that's the  
6 measurement of the difference between the heavy  
7 fraction and the light fraction.

8 Q. And the percentage reporting, is that like  
9 a qualitative visual estimate from what the analyst  
10 is seeing on the slides as opposed to a quantitative  
11 calculation when I look at that, your PLM reports on  
12 chrysotile on Johnson & Johnson samples?

13 A. Yes. There's only two ways that you can  
14 do the estimated weight percent. You can do point  
15 counting, which we don't do because we found it not  
16 very accurate, but you have a visual estimate of the  
17 percentage you're seeing and that's what you write  
18 down, and it's usually a range.

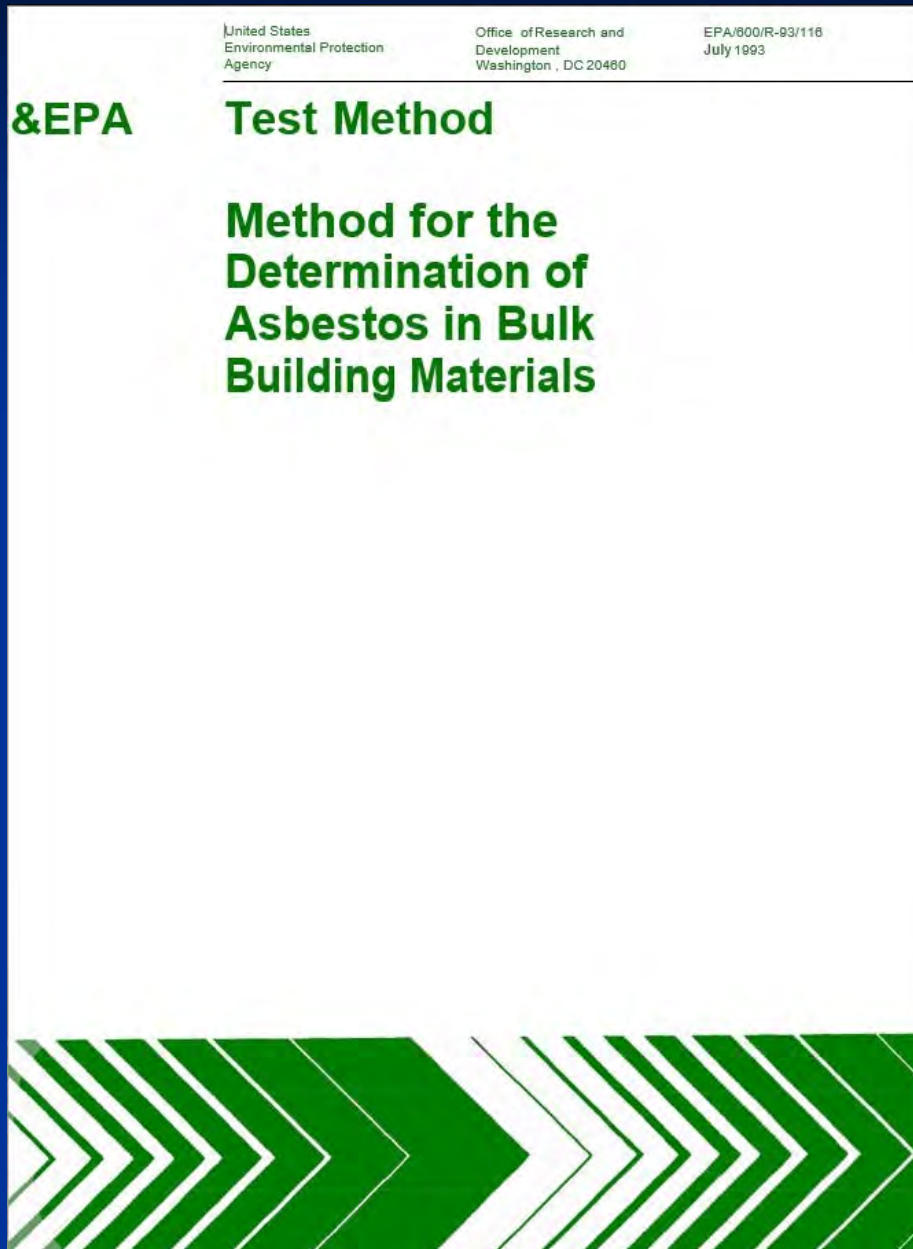
19 Q. Okay. That's what your laboratory does,  
20 this sort of visual estimate of what you're seeing in  
21 terms of area by a percent basis, right?

22 A. Right.

23 Q. Okay. And then when I see -- you know,  
24 when you report that in terms of chrysotile bundles  
25 per gram, the way that you calculate that number for

Priority-One Court Reporting Services Inc. - A Veritext Company  
718-983-1234

**In Dr. Longo's deposition on March 22, 2024 he claims that EPA's **Point Counting** is not very accurate and used Visual Estimate for quantitation**



## Baby powder is a friable material.

This Latin adjective comes from the verb "friare," which means "**to crumble**." "Friare" in turn is related to the verb "fricare" ("to rub"), the source of the English noun "friction." "Friable" is used to describe something that can be easily reduced to a powdered form. In contemporary usage, it is often found in the discussion of asbestos.

[Friable Definition & Meaning - Merriam-Webster](#)

**Point counting quantitation is required by U.S. EPA (1982) EPA-600-82-020 Interim method for the determination of asbestos in friable materials.**

*1.7.2.4 Quantitation of Asbestos Content*  
Asbestos quantitation is performed by a point-counting procedure.

**MAS did not follow the official EPA 600 M4 82-200 **point counting** procedure for quantitation of asbestos content in friable materials.**



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PageID# 252973

# Reference Chart for Visual Estimate (Su, 2022)

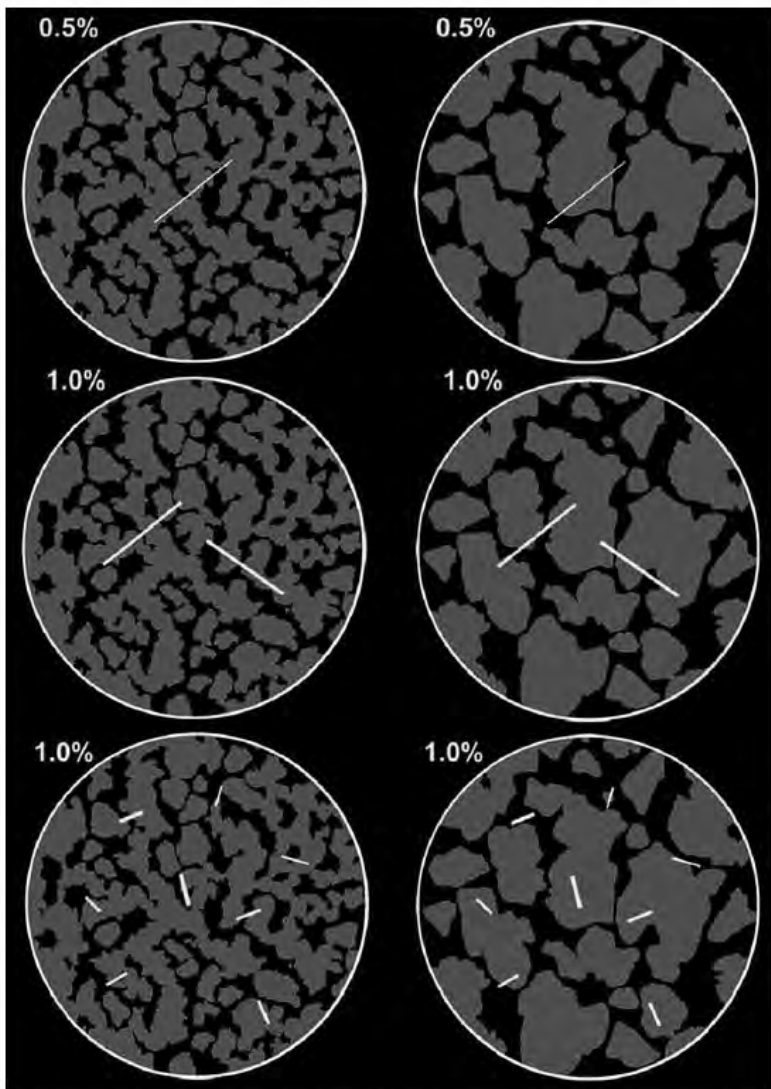
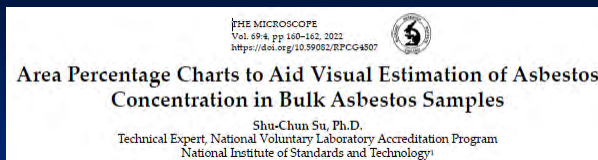


Figure 3. 0.5–1.0% with 65% of the field of view filled with matrix.

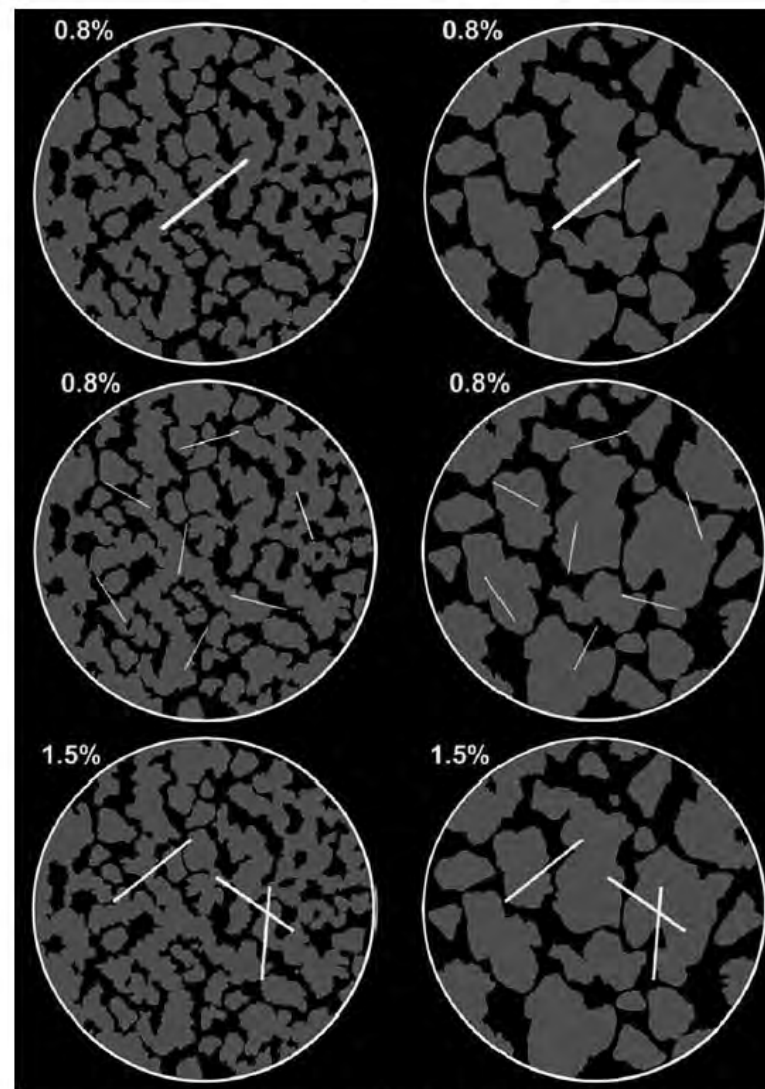


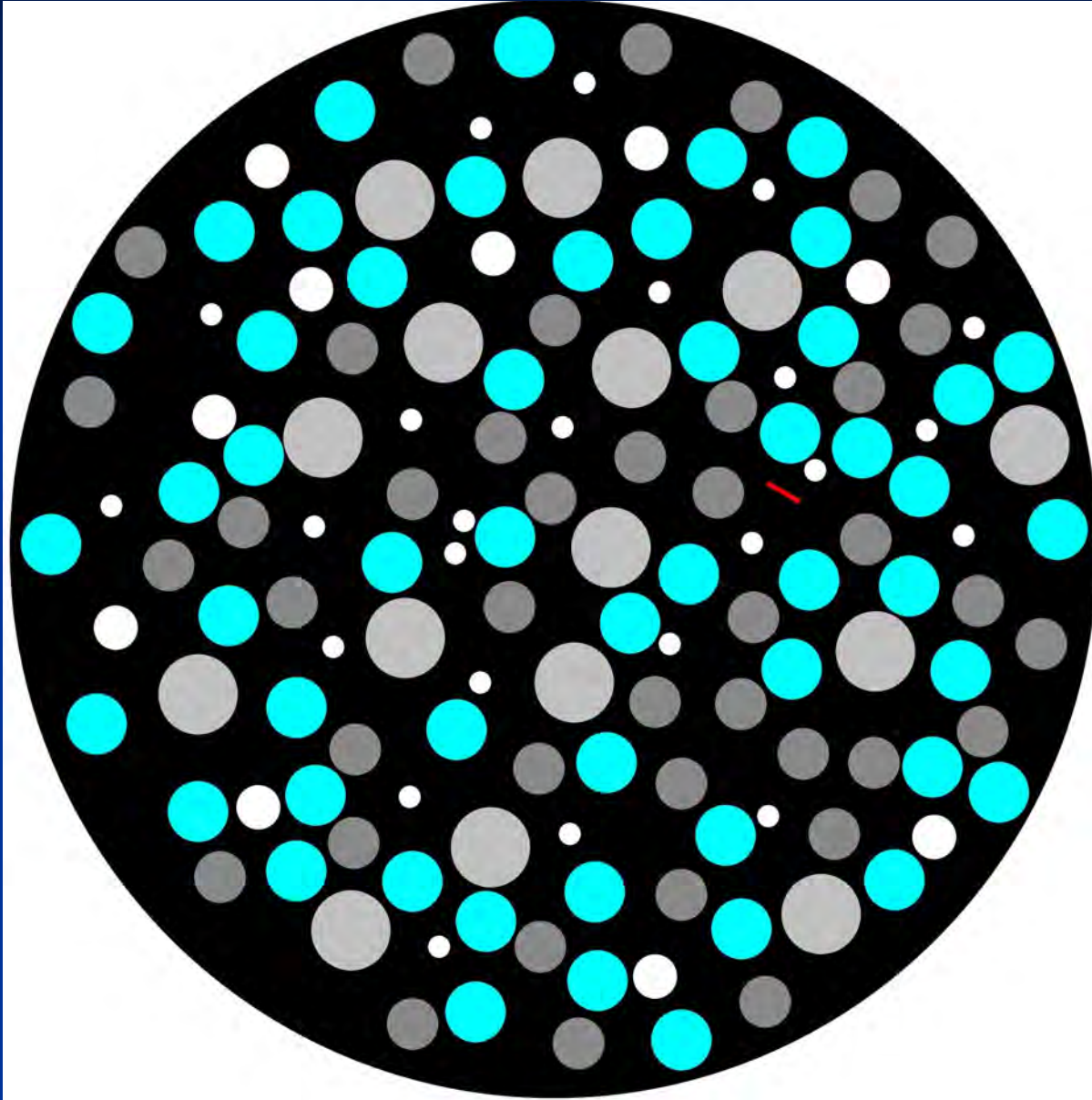
Figure 4. 0.8–1.5% with 65% of the field of view filled with matrix.

These are the asbestiform reference charts at 0.X% to meet AHERA requirement for differentiating ACM (asbestos containing material) from Non-ACM. The differentiating factor is 1% by weight:

ACM > 1%  
Non-ACM ≤ 1%  
These charts have been widely used by US asbestos laboratories and were formally published in 2022 by Shu-Chun Su.

# Can the Asbestos % in the Image be Visually Estimated?

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**The red fiber is asbestos. The round objects are talc particles.**

**There is no established analytical protocol to do Visual Estimate at such low concentration levels.**



## 2023-02-28 - Valadez Bottle Report

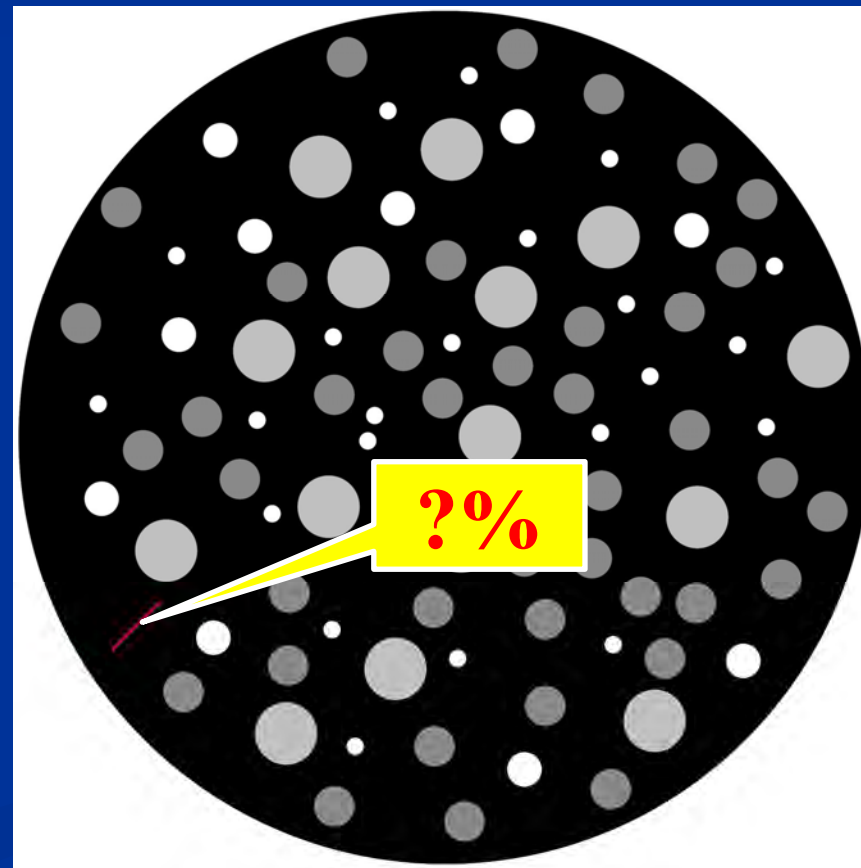
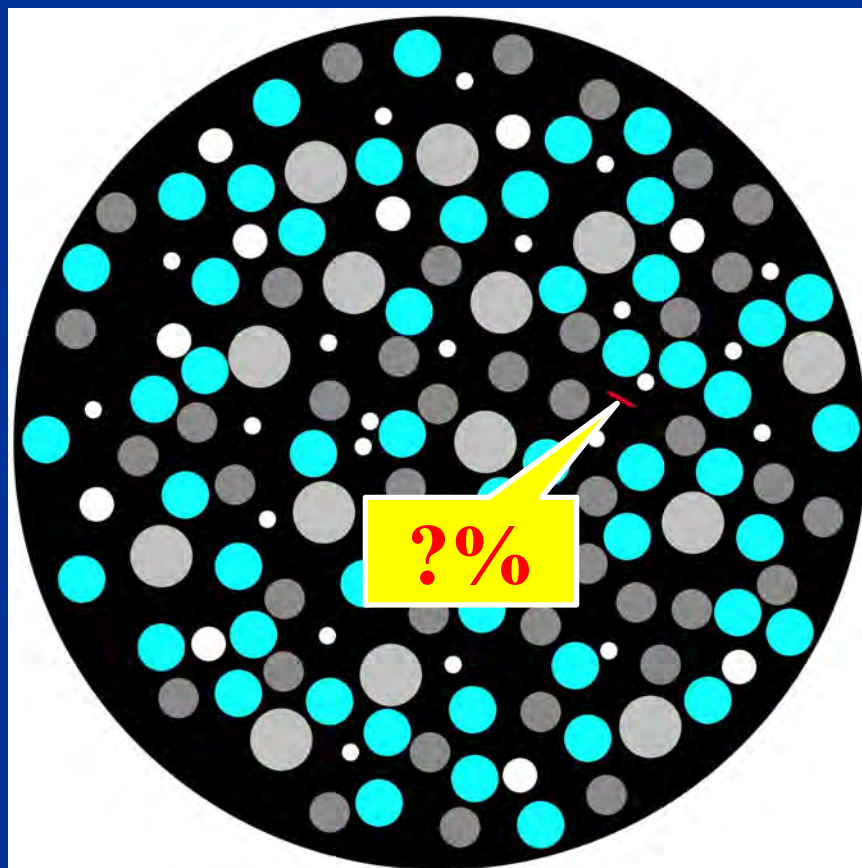
Table 2  
 Overall Summary of the JBP Asbestos Sample Analysis Results

MAS Sample #	ATEM Amphibole Asbestos	ISO-NY PLM Wt. % Amphibole Asbestos	CSM-PLM w/o HLS Chrys %	CSM Weight Recovery Light fraction	CSM Chrys % Weight Corrected**
M71614-001	<52,000	NSD	0.002-0.004	15.8%	0.0003-0.0006

\*NSD: No Structure Detected \*\*Weight Corrected

➤ According to Dr. Longo's March 22, 2024 deposition, the 0.002 – 004% CSM-PLM w/o HLS Chrys% was visually estimated.

➤ Can anyone visually estimate the red fiber's percentages among the matrix round objects?





## Impossible Error Rate of Visual Estimate

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# MAS's 0.005% Error Rate Defies Common Sense

## REMOTE DEPOSITION OF WILLIAM E. LONGO, PhD

April 2, 2024

Kayme Clark (NJ) - WilliamLongoVol2-20240402.PDF

11 these than I do. So, it's just a visual estimate.

12 It's their opinion.

13 Q. And it's a qualitative number,  
14 qualitative assessment, right?

15 A. A visual estimate -- it typically may  
16 have an error rate of .005 percent or something.  
17 They're all qualitative. Every time somebody does  
18 PLM and puts a weight percent down, it's called  
19 qualitative.

20 Q. Okay. That error rate that you just  
21 referenced, where did you pull that from? That's  
22 not from your --

23 A. It --

24 (Court Reporter clarification.)

25 BY MR. HYNES:

Priority-One Court Reporting Services Inc. - A Veritext Company  
718-983-1234

LONGO, Ph.D. - DIRECT

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1 Q. I was going to say, that error rate  
2 isn't specific to this chrysotile by PLM?

3 A. No. It's more specific. And,  
4 typically, NVLAP, they would send you a known  
5 sample, and you had a range of where it could be.  
6 You know, if it was 10 percent. And I forget what  
7 they allowed before they started knocking points  
8 off.

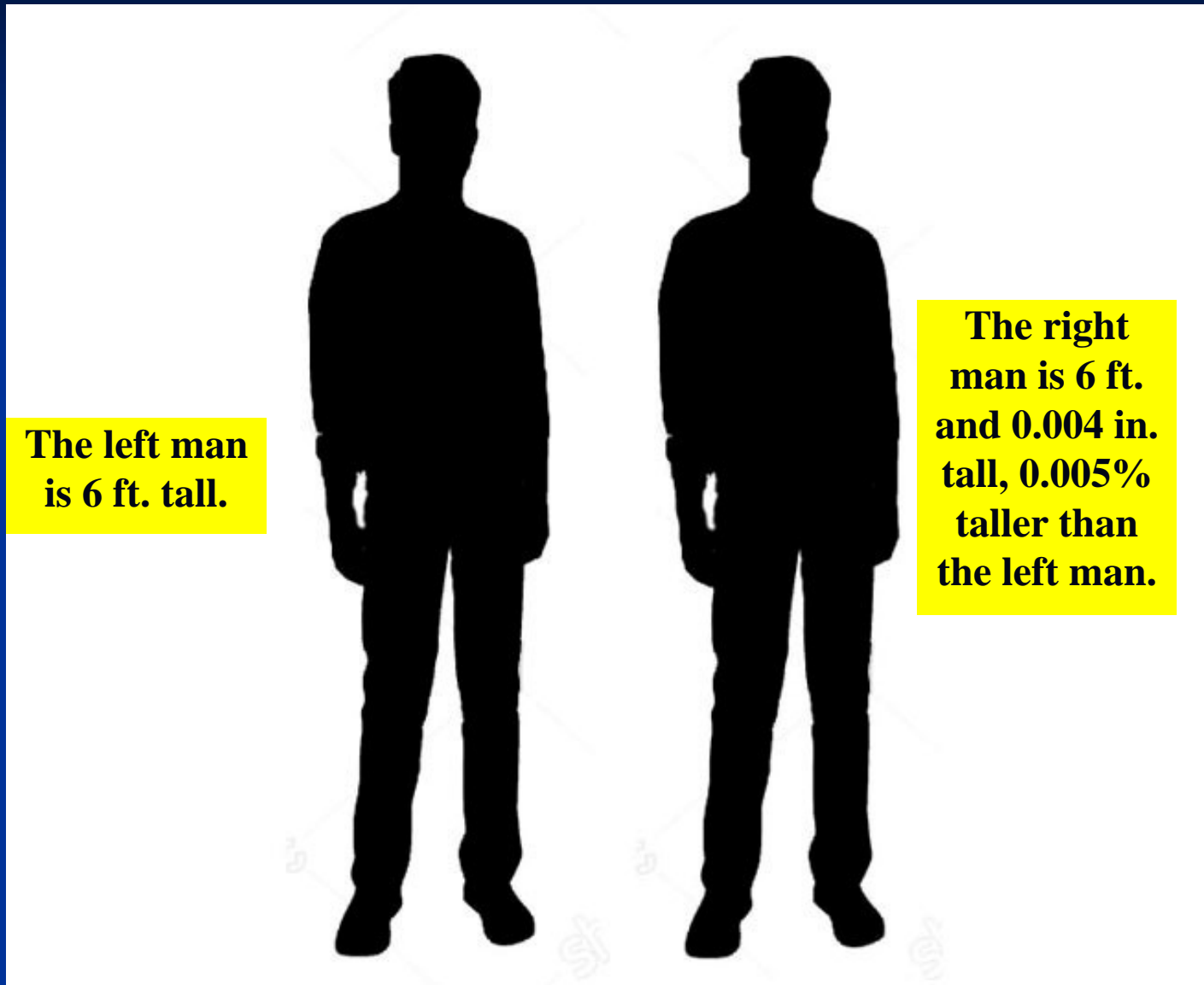
9 Q. So, that is based on NVLAP

**In Dr. Longo's April 2, 2024 deposition, he claimed that MAS's typical error rate of Visual Estimate was 0.005%**

**It is not qualitative but quantitative.**

**NVLAP's acceptable error rate of **Calibrated Visual estimate** or **CVE** is a single-digit percentage, for example,  $\pm 5\%$ , not an error rate at the third decimal place.**

# The 0.005% Error Rate of Visual Estimate Defies Common Sense



**The left man  
is 6 ft. tall.**

**The right  
man is 6 ft.  
and 0.004 in.  
tall, 0.005%  
taller than  
the left man.**

**Can a human being visually tell the difference that the right man is  
taller by 0.004 inches? No.**



**Incorrect Extrapolation Procedure.**

Valadez J & J Baby Powder Container



## 2023-02-28 Valadez Bottle Report

**Table 2**  
Overall Summary of the JBP Asbestos Sample Analysis Results

MAS Sample #	ATEM Amphibole Asbestos	ISO-NY PLM Wt. % Amphibole Asbestos	CSM-PLM w/o HLS Chrys %	CSM Weight Recovery Light fraction	CSM Chrys % Weight Corrected**
M71614-001	<52,000	NSD	0.002-0.004	15.8%	0.0003-0.0006

\*NSD: No Structure Detected \*\*Weight Corrected

**Table 3**  
Overall Summary of the Calculated Chrysotile BIR CSM-PLM Data (RI Fluid 1.650)

MAS Sample #	Chrysotile RI Values CSM-PLM	Birefringence Calculations
M71614-001	1.568-1.564	0.004-0.007
	1.564-1.557	avg. = 0.006
	$\alpha$ range $\gamma$ 1.564-1.557 1.568-1.564	Avg. = 0.006

**Table 6**  
Chrysotile  
Range of Parallel and Perpendicular RIs

Chrysotile Bundle No.	RI Fluid	CSM PLM (with HLS) Parallel RI	CSM PLM (with HLS) Perpendicular RI	BIR Calculations $\gamma - \alpha$
M71614-001	1.560			
1		1.564	1.561	0.003
2		1.565	1.561	0.003
3		1.568	Avg. 1.559	0.009
4		Avg. 1.567	Avg. 1.562	0.005
		Avg. 1.566	Avg. 1.561	0.005

### Estimation of the Number of Chrysotile Bundles Detected for CSM PLM Methods

Using the number of chrysotile bundles counted during the PLM analysis, and the amount of talcum powder analyzed in a specified area on the cover slip mount per the two glass slides, the amount of chrysotile bundles per gram of talcum powder sample can be calculated.

Total chrysotile bundles in the sample is calculated as shown in the following equation:

$$(A1 \div A2) \times (CB) \div W = TCB/W$$

Where:

A1: The total area (972 mm<sup>2</sup>) that the talcum powder occupies on the two glass slides.

A2: The area (23.55 mm<sup>2</sup>) in thirty fields of view that the talcum powder occupies on the two glass slides.

CB: Number of chrysotile bundles detected in a positive sample by PLM analysis.

W: Weight of total talcum powder placed on the two glass slides.

TCB/W: Total number of chrysotile bundles per weight (grams) of talcum powder.

The results of CSM sample preparation analysis calculations are shown in Table 4.

**Table 4**  
Summary of Estimated Chrysotile Bundles per gram Calculations For the CSM PLM Results

MAS Sample #	wt. of sample grams	No. of Chrys Bundles counted	CSM/ISO Chrysotile Bundles/g	CSM/ISO* Chrysotile Bundles/g
M71614-001	0.0007	6	354,000	56,000*
			Avg. = 354,000	Avg. = 56,000*

Weight corrected\*

## MAS's Conclusions

- This baby powder contains **0.0003 – 0.0006%** of chrysotile.
- Each gram of talc contains **56,000** chrysotile bundles.



# MAS PLM Extrapolation Procedure Is Unpublished, Unvalidated, Unreliable, and Not Scientifically Justified

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## Estimation of the Number of Chrysotile Bundles Detected for CSM PLM Methods

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Table 4  
Summary of Estimated Chrysotile Bundles per gram Calculations  
For the CSM PLM Results

MAS Sample #	wt. of sample grams	No. of Chrys Bundles counted	CSM/ISO Chrysotile Bundles/g	CSM/ISO* Chrysotile Bundles/g
M71614-001	0.0007	6	354,000	56,000*
			Avg. = 354,000	Avg. = 56,000*

Weight corrected\*

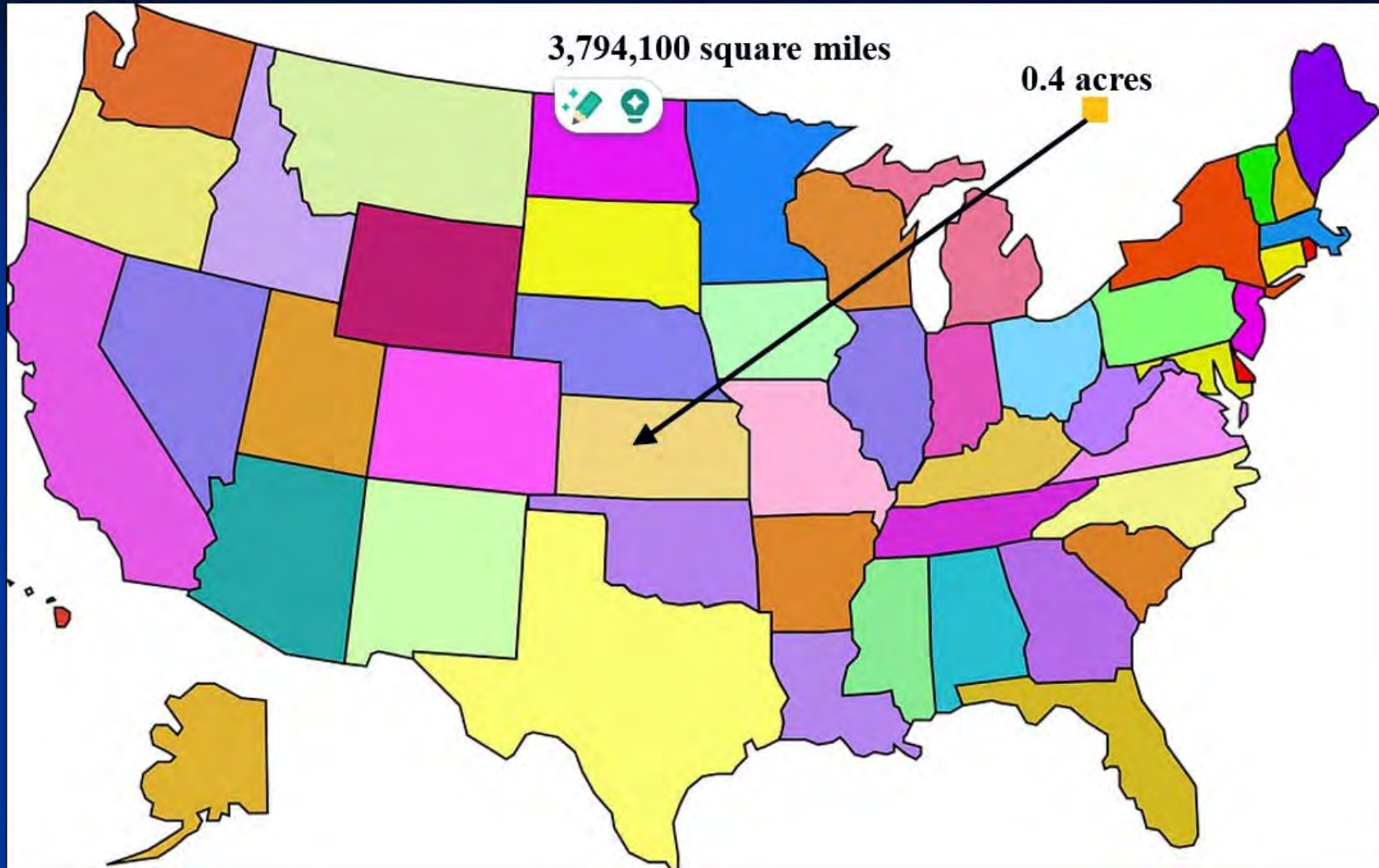
Out of a 1.5 oz. container, MAS separated out **0.0007 grams** of talc powder for analysis.

Out of the 0.0007 grams sample, Only **2.4%** or **0.000017 grams** was actually counted.

Based on the counting results of the 0.000017-gram sample, MAS concluded that one gram of talc powder contains **56,000** chrysotile bundles.

The results of 0.000017 grams were extrapolated to 1 gram of talc powder. The extrapolation factor is **58,824** times!

# 0.000017-Gram PLM Results Extrapolated to 1 Gram of Talc



**The total area of the United States is three million seven hundred ninety-four thousand one hundred square miles. Using 0.000017-gram results to extrapolate to 1 gram of talc is like using a survey of the soil of a 0.4-acre backyard in a Kansas home to represent the soil of the whole United States.**



A motor vehicle plant produces 58.000 cars in a year.



Using the measurement results of 0.000017 grams sample to evaluate 1 gram of talc is like using the Quality Control check results of one vehicle to represent all 58,000 vehicles produced in a year. It is not an acceptable practice.



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PageID: 252385

## 0.000017-Gram PLM Analysis is Far From Sufficient to Ensure a $< 5\%$ False Positive

- Any analytical procedure has errors. Asbestos analysis is no exception.
- There are two types of analytical errors: Type 1 – **False Positive** and Type 2: False Negative.
- For litigation-related analysis, the False Positive error rate must be kept under 5% or 1%
- In other words, the analytical procedure's Confidence Level (CL) must be at least 95% to ensure a  $< 5\%$  False Positive error rate.
- In product liability analysis, a 95% CL test has a 5% probability of wrongly implicating an innocent product.
- MAS should pay more attention to the established sampling protocol and arbitrarily choose the amount of sample to be analyzed, which results in unacceptable False Positive rates.

## Equation for Calculating Sample Size

$$n = p(1 - p) \left( \frac{z}{E} \right)^2$$

where

- $n$  – sample size that is large enough to attain the specified maximum allowed error and confidence level
- $p$  – a rough estimate of population proportion ( $B\%$ )
- $E$  – MAE (maximum allowed error)
- $z$  – critical value from normal distribution corresponding to the specified confidence level

$z = 1.96$  for 95% confidence level

$z = 2.575$  for 99% confidence level

*Note: 1. Given  $z$  and  $p$ , this equation can be used to calculate the margin of error associated with a specific  $n$*

*2. The derivation of this equation is omitted in this presentation, which can be found in general probability/statistics texts*

June 10, 2008

Shu-Chun Su: CARB M-435

22 of 40

**All reliable methodologies require a sample size calculation to ensure a 95% Confidence Level and keep the False Positive error rate under 5%. Above is an example that I provided to the California Air Resources Board in 2008.**

**MAS did not perform any such calculation as part of its PLM methodology, which is scientifically inappropriate.**

## Equation for Calculating Sample Size

$$n = p(1 - p) \left( \frac{z}{E} \right)^2$$

where

- $n$  – sample size that is large enough to attain the specified maximum allowed error and confidence level
- $p$  – a rough estimate of population proportion ( $B\%$ )
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June 10, 2008

Shu-Chun Su: CARB M-435

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The above equation can be used to calculate the Confidence Level for known sample size, population proportion, and maximum allowed error. The Confidence Level of 2023-02-28 Valadez Bottle Report is far below 50%, making the False Positive error rate much greater than 50%. Such a False Positive error rate is totally unacceptable. A responsible laboratory will never adopt such a sampling scheme to make the False Positive error rate greater than 50%.



**Internally Conflicting Quantification Results.**

## 2021-05-25 OTShelf JBP Purchased Argentina (M71228-001)



**MAS reported 137,000 chrysotile bundles constituting a 0.005 – 0.006%wt. asbestos concentration.**

Date of Report	2021-05-25
MAS No.	71228-001
Product	Argentina
Chrysotile %	0.005 - 0.006
Chrysotile Bundles per gram of baby powder	137000
Image of 71228-001 Chrysotile	p.39
Scale bar length (μm)	100
Length of Scale Bar on screen (pixel)	95.0
Chrysotile length on screen (pixel)	97.0
Chrysotile length (μm)	102.1
Chrysotile width on screen (pixel)	9.0
Chrysotile width (μm)	9.5
Chrysotile thickness (μm)	9.5
Single chrysotile volume (μm <sup>3</sup> )	9164.02
Single chrysotile volume (mm <sup>3</sup> )	0.0000091640
Total volume of chrysotile bundles (mm <sup>3</sup> )	1.255470
Talc density (g/cm <sup>3</sup> )	2.72
Volume of 1 gram chrysotile (cm <sup>3</sup> )	0.368
Volume of 1 gram chrysotile (mm <sup>3</sup> )	367.6
Percentage of chrysotile	0.34%

Table 2 Overall Summary of Off-The-Shelf JBP Container Sample Analysis Results						
MAS Sample #	ISO-PLM w/o HLS Chrysotile %	Chrysotile Bundles Counted ISO	CSM/ISO-PLM with HLS chrysotile %	Chrysotile Bundles Counted CSM-ISO	Weight Recovery CSM-ISO	CSM/ISO-PLM with HLS chrysotile %
M71216-001	0.016-0.017	53	*0.022-0.023	70	24.2%	**0.005-0.006
M71216-002	0.009-0.012	33	0.014-0.015	48	21.4%	0.003
M71216-003	0.016-0.017	39	0.019-0.020	63	21.3%	0.004
	Range 0.009-0.017	Avg. 41 Bundles	Range 0.014-0.023	Avg. 60 Bundles	Avg. 22.3%	Range 0.003-0.006

\*CSM chrysotile weight concentrations not weight corrected. \*\*CSM chrysotile weight concentrations recovery corrected

Table 5 Summary of Estimated Chrysotile Bundles per gram Calculations for the JBP ISO & CSM PLM Results						
MAS Sample #	ISO-PLM Wt of Sample Grams	No. of Chry Bundle counted	Chrysotile Bundles/g	Wt. of Sample in Grams	No. of Chry Bundles counted	Chrysotile Bundles/g
M71228-001	0.0010	53	567,000	0.0010	70	749,000
M71228-002	0.0010	33	353,100	0.0010	48	514,000
M71228-003	0.0009	39	464,000	0.0011	63	613,000
	Avg. 0.0097	Avg. 42 Chry Bundles	Avg. 461,000	Avg. 0.00103	Avg. 60 chry Bundles	Avg. 625,000

**Reported: 0.005 – 0.006; Calculated: 0.34%. Differing by 62 times.**

**The conclusion is that MAS's quantification results are NOT credible.**

**Inaccurate and Unreliable  
Sample Preparation Procedure.**



# Incorrect Sample Preparation Procedure

2020 - 2024 HLS Results				
Date	MAS No.			Light Fraction %
2020-09-17	M71666	001	1	17.0
			2	14.6
			3	13.4
2021-05-25	M71216	001	1	24.2
			2	21.4
			3	21.3
2023-02-28	M71614	001	1	15.9
2023-10-19	M71643	001	1	19.7
2024-02-15	M71740	001	1	25.7

Since MAS's chrysotile concentration is at the 0.00x% level, talc is then at 99+% level. If the Heavy Liquid Separation (HLS) sample preparation procedure was correctly performed, the Light Fraction would be **< 1%**. MAS's **two-digit Light Fraction** results clearly indicate that MAS was NOT capable of correctly performing the HLS sample preparation procedure.

# Summary of Deficiencies of MAS's Analytical Procedures

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- Inability to ensure a 95% Confidence Level of quantification.
- Inability to correctly interpret dispersion staining colors.
- Inability to calibrate dispersion staining colors.
- Inability to understand the basic relationship between the material's refractive index and the refractive index of liquids used for measurement.
- Inability to conduct calibrated visual estimate (CVE).
- Inability to check the internal consistency of analytical data.
- Inability to correctly measure particle size under a polarized light microscope.
- Inability to correctly create scale bars.
- Inability to understand the fundamental physics principles governing the relationship between a material's refractive index and its physical dimension.
- Inability to understand the fundamental geological principles governing the formation of minerals and mineral ore deposits.

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# Exhibit 73

Shu-Chun Su  
July 18, 2024

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Clark v. Asbestos  
ROUGH DRAFT

1

SUPERIOR COURT OF NEW JERSEY  
LAW DIVISION - MIDDLESEX COUNTY  
DOCKET NO. MID-L-003809-18AS

KAYME A. CLARK and  
DUSTIN W. CLARK,

Plaintiffs,

v.

DEPOSITION UPON  
ORAL EXAMINATION  
OF

^

(VOLUME II)

JOHNSON & JOHNSON, et al.,

Defendants.

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TRANSCRIPT of the stenographic notes  
of ANDREA F. NOCKS, a Certified Court Reporter and  
Certified Realtime Court Reporter of the State of  
New Jersey, Certificate No. XI01573, taken at THE  
HELDRICH HOTEL, 10 Livingston Avenue, New Brunswick,  
New Jersey, on Thursday, July 18, 2024, commencing  
at ^ a.m., Eastern Standard Time.

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Shu-Chun Su  
July 18, 2024

\*\*\*ROUGH DRAFT\*\*\*

Clark v. Asbestos  
ROUGH DRAFT

<p style="text-align: right;">2</p> <p>1 APPEARANCES: 2 DEAN OMAR BRANHAM SHIRLEY LLP 3 BY: BENJAMIN BRALY, ESQ. 4 302 North Market Street 5 Suite 300 6 Dallas, Texas 75202 7 Attorneys for Plaintiffs 8 9 KING &amp; SPALDING 10 BY: KEVIN HYNES, ESQ. 11 1185 Avenue of the Americas 12 34th Floor 13 New York, New York 10036 14 -AND- 15 McCARTER &amp; ENGLISH 16 BY: JOHN C. GARDE, ESQ. 17 Four Gateway Center 18 100 Mulberry Street 19 Newark, New Jersey 07102 20 Attorneys for Defendant, 21 Johnson &amp; Johnson 22 23 ^ 24 25</p>	<p style="text-align: right;">4</p> <p>1 EXHIBITS 2 NUMBER DESCRIPTION IDENTIFICATION 3 34 4 35 5 36 6 37 7 38 8 39 9 40 10 41 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25</p>
<p style="text-align: right;">3</p> <p>1 INDEX 2 PAGE 3 WITNESS: 4 ^ 5 EXAMINATION BY: 6 MR. BRALY 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25</p>	<p style="text-align: right;">5</p> <p>1 ^ previously duly sworn 2 CONTINUED DIRECT EXAMINATION BY MR. BRALY: 3 Q. How are you? 4 A. I'm fine. 5 Q. Good to see you again. 6 A. Good to see you again. 7 Q. I said no, but it is actually kind of 8 an important point. You understand that you are 9 still under oath from the last time? 10 A. Understood. 11 Q. Great. So you're going to tell me 12 the truth? 13 A. Yes. 14 Q. Good. 'Cause otherwise, we would 15 have a real problem. 16 A. Sure. 17 Q. Have you conducted any additional 18 analytical experimentation or evaluation of the 19 issues pertaining to either the Clark case or the 20 MDL case since our last deposition? 21 A. No. 22 Q. Okay. I want to talk to you a little 23 bit about the Becke Line method of refractive index 24 calculation. Okay? 25 A. Okay.</p>

2 (Pages 2 to 5)



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\*\*\*ROUGH DRAFT\*\*\*

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<p style="text-align: right;">6</p> <p>1 Q. It is a true statement that the</p> <p>2 dispersion staining method is a method to determine</p> <p>3 the refractive index of a particle, correct?</p> <p>4 A. Is what method?</p> <p>5 Q. That's a true statement, that it is a</p> <p>6 method?</p> <p>7 A. One of the methods.</p> <p>8 Q. Yes. There's another method that's</p> <p>9 called the Becke Line method for determining the</p> <p>10 refractive index of a particle, correct?</p> <p>11 A. Correct.</p> <p>12 Q. What I gathered from our last meeting</p> <p>13 was that you are taking the position that when you</p> <p>14 do dispersion staining, when you're looking at the</p> <p>15 colors under the polarizer, that you have to switch</p> <p>16 the objective to the Becke setting and evaluate</p> <p>17 where on the particle the Becke Line matches the</p> <p>18 refractive index fluid. Or most closely matches the</p> <p>19 refractive index fluid?</p> <p>20 A. I should say it is not to find the</p> <p>21 Becke Line matches the color, it is to find out</p> <p>22 where is the true Becke Line and the dispersion</p> <p>23 staining color.</p> <p>24 Q. Okay.</p> <p>25 A. The dispersion staining color, they</p>	<p style="text-align: right;">8</p> <p>1 the dispersion staining setting is for the observing</p> <p>2 the dispersion staining color. You see? The</p> <p>3 setting and the method, it's part of method, it's</p> <p>4 not just change the setting; it change the test</p> <p>5 method.</p> <p>6 Q. So, when you perform this, when you</p> <p>7 switch the objective from central stop to the Becke</p> <p>8 setting, or the no-stop setting, I suppose is what</p> <p>9 it is --</p> <p>10 A. Um-hum.</p> <p>11 Q. -- are you saying that you're</p> <p>12 utilizing a completely separate method to confirm</p> <p>13 the other method?</p> <p>14 A. That's right.</p> <p>15 Q. I did a review of your entire report,</p> <p>16 the report that you issued in May, and the word</p> <p>17 "Becke" appears twice, and they're both in your</p> <p>18 article list, your list of references.</p> <p>19 You would agree that nowhere in your</p> <p>20 report do you provide a criticism of Dr. Longo</p> <p>21 relative to some supposed failure to use the Becke</p> <p>22 Line method?</p> <p>23 A. Could you say question again?</p> <p>24 Q. Yes.</p> <p>25 A. Please.</p>
<p style="text-align: right;">7</p> <p>1 are corresponding. Like you say, you have a series,</p> <p>2 a range of the color, dispersion staining color.</p> <p>3 Now, which one is the one we're presenting the true</p> <p>4 refract index, you would have to switch the Becke</p> <p>5 Line to examine the Becke Line characteristics to</p> <p>6 determine which color --</p> <p>7 Q. Okay.</p> <p>8 A. -- is present in the true refract</p> <p>9 index.</p> <p>10 Q. So when you say you have to switch,</p> <p>11 you're talking about switching the setting in the</p> <p>12 objective, which is a piece of the microscope?</p> <p>13 A. That's right.</p> <p>14 Q. To remove what's called the central</p> <p>15 stop?</p> <p>16 A. That's right.</p> <p>17 Q. Right.</p> <p>18 What you're describing is not the</p> <p>19 Becke Line method of determining the refractive</p> <p>20 index 'cause that's a completely separate</p> <p>21 methodology, right? It's using the Becke Line</p> <p>22 setting to help confirm the dispersion staining</p> <p>23 method?</p> <p>24 A. No. So-called, the Becke Line</p> <p>25 setting, is in order to observe the Becke Line, like</p>	<p style="text-align: right;">9</p> <p>1 Q. Nowhere in your report do you discuss</p> <p>2 utilizing the Becke Line method to confirm or to</p> <p>3 critique the analysis that Dr. Longo performed in</p> <p>4 his dispersion staining analysis.</p> <p>5 A. I don't have to, because he said he's</p> <p>6 a self-taught polarized light microscopy expert.</p> <p>7 Any expert should know that. It's, like, common</p> <p>8 knowledge. Yeah.</p> <p>9 I only said his determination using</p> <p>10 the dispersion staining technique is incorrect.</p> <p>11 Q. Where he takes the color based --</p> <p>12 A. That's right. I don't have to point</p> <p>13 out where he's incorrect. Okay.</p> <p>14 Q. No, no, no. I get it. You think</p> <p>15 he's wrong, you're saying that you don't have to</p> <p>16 point out exactly how he's wrong.</p> <p>17 A. That's right.</p> <p>18 Q. And of course, Dr. Longo is taking</p> <p>19 the position, I suppose, that the color at the edge,</p> <p>20 or the border of the fluid and the particles where</p> <p>21 you should be reviewing the coloring, you think</p> <p>22 that's wrong?</p> <p>23 A. Now, you mention color. Let me make</p> <p>24 it clear, color does not identify mineral, does not</p> <p>25 identify any mineral, including asbestos mineral.</p>

3 (Pages 6 to 9)

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\*\*\*ROUGH DRAFT\*\*\*

Clark v. Asbestos  
ROUGH DRAFT

<p style="text-align: right;">10</p> <p>1 Color is not an intrinsic property.</p> <p>2 Q. I understand.</p> <p>3 A. Refract index is. You see, there's</p> <p>4 no literature, no methods, whether EPA, ISO or ASTM,</p> <p>5 they identify, describe, asbestos by color. Okay?</p> <p>6 Q. But that's not what I asked you.</p> <p>7 A. No, no, no. I want make -- because</p> <p>8 I --</p> <p>9 Q. I want you to answer my question.</p> <p>10 A. Yes. That's what I'm answering, the</p> <p>11 color question.</p> <p>12 Q. You're not. I know the color</p> <p>13 corresponds to wavelength. I know this. That's not</p> <p>14 what I'm asking you.</p> <p>15 A. What wavelengths?</p> <p>16 Q. Yeah.</p> <p>17 A. What wavelengths?</p> <p>18 Q. That you can take the color and</p> <p>19 compare it to a chart that you've developed to</p> <p>20 determine a range of wavelengths --</p> <p>21 A. What wavelengths, the question is.</p> <p>22 This a very central issue of this debate.</p> <p>23 Q. I'm not debating with you.</p> <p>24 A. No, no, no, no. A discussion, the</p> <p>25 central --</p>	<p style="text-align: right;">12</p> <p>1 Q. One of the ways that you believe he</p> <p>2 was incorrect is because he didn't follow the</p> <p>3 methodology of switching to no-stop in evaluating</p> <p>4 where the Becke Line was?</p> <p>5 A. No, I'm not saying that. I'm saying</p> <p>6 that -- I said he is incorrectly performing the</p> <p>7 dispersion staining technique; I didn't say he did</p> <p>8 not switch. Because it's not tutorial. I don't</p> <p>9 have to tell him what -- how to -- what's the</p> <p>10 correct way to performing the technique.</p> <p>11 Q. I have a series of articles that you</p> <p>12 published that I want to talk to you about briefly.</p> <p>13 A. Okay.</p> <p>14 Q. Like before, let me get set up.</p> <p>15 Exhibit 34 is going to be an article</p> <p>16 that you published in "American Mineralogist" in</p> <p>17 2003 --</p> <p>18 A. Yeah.</p> <p>19 Q. -- called "Rapid and Accurate</p> <p>20 Procedure for the Determination of Refractive</p> <p>21 Indices of Regulated Asbestos Minerals."</p> <p>22 I take it you're familiar with this?</p> <p>23 A. Yes, that's my paper.</p> <p>24 Q. Yes.</p> <p>25 In this paper, you do not discuss</p>
<p style="text-align: right;">11</p> <p>1 Q. Doctor, please. I'm just asking you</p> <p>2 questions.</p> <p>3 A. Yes.</p> <p>4 Q. I'd appreciate if you'd focus on the</p> <p>5 question I'm asking.</p> <p>6 A. I am focusing on the question.</p> <p>7 MR. HYNES: Let him finish the</p> <p>8 question.</p> <p>9 BY MR. BRALY:</p> <p>10 Q. Let's start over.</p> <p>11 All I was trying to get at is that</p> <p>12 Dr. Longo evaluates the image at the border of where</p> <p>13 the fluid and the particle are coming together, at</p> <p>14 least that's what he said, and you disagree with</p> <p>15 that as a methodology for identifying what it is</p> <p>16 that he's looking at?</p> <p>17 A. No, I'm not disagreeing with that. I</p> <p>18 said his methodology is wrong; he was not correctly</p> <p>19 performing the technique.</p> <p>20 Q. Okay. One of the ways that he was</p> <p>21 not correctly performing the technique is because he</p> <p>22 didn't utilize this objective switch to the --</p> <p>23 A. No, no, no. I never --</p> <p>24 Q. Let me finish my question.</p> <p>25 A. Okay. Sorry.</p>	<p style="text-align: right;">13</p> <p>1 using Becke Lines or the Becke Line method to</p> <p>2 confirm what you're looking at by dispersion</p> <p>3 staining, correct?</p> <p>4 A. I don't have to.</p> <p>5 Q. Just answer my question.</p> <p>6 A. Yes, I did not, because I don't have</p> <p>7 to. Okay.</p> <p>8 Q. So, for an analyst or somebody</p> <p>9 reviewing the peer-reviewed literature, they would</p> <p>10 have no idea based on this paper from 2003 that you</p> <p>11 believe that you should confirm what they're seeing</p> <p>12 by dispersion staining by doing a Becke Line</p> <p>13 analysis?</p> <p>14 MR. HYNES: Calls for speculation.</p> <p>15 THE WITNESS: Can I answer the</p> <p>16 question?</p> <p>17 MR. HYNES: Yeah, you can answer the</p> <p>18 question.</p> <p>19 A. If a analyst using the dispersion</p> <p>20 staining technique to determine a refract index. If</p> <p>21 he is a trained analyst, he should know how do you</p> <p>22 need to distinguish the normal dispersion staining</p> <p>23 color from the distorted dispersion staining color.</p> <p>24 And he should know, in many cases he's trained, he</p> <p>25 should use the other method to distinguish that,</p>

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\*\*\*ROUGH DRAFT\*\*\*

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<p style="text-align: right;">14</p> <p>1 which Becke Line is the most effective method.</p> <p>2 Q. Have you ever published that a</p> <p>3 dispersion staining analysis should be coupled with</p> <p>4 a Becke Line analysis in order to confirm what it is</p> <p>5 that's being looked at by dispersion staining?</p> <p>6 A. No, I don't have to. Okay.</p> <p>7 Q. You don't have to because you presume</p> <p>8 people should know if they're well trained and run a</p> <p>9 good lab?</p> <p>10 A. Not well trained. If you are</p> <p>11 trained, you should know because Becke Line is the</p> <p>12 first technique to determine refract index.</p> <p>13 Dispersion staining technique came later in 1930s,</p> <p>14 okay, but Becke Line was developed way before that.</p> <p>15 Anyone who has a trained analyst using polarized</p> <p>16 light microscopy determine by refract index should</p> <p>17 know that, should know both technique and should</p> <p>18 know when do you use the technique to confirm each</p> <p>19 other.</p> <p>20 Q. Okay. In your work for NVLAP,</p> <p>21 N-V-L-A-P -- your work for NVLAP, you accredited --</p> <p>22 you personally accredited MAS as a PLM laboratory</p> <p>23 that performed PLM analysis in ways that were in</p> <p>24 accordance with standards?</p> <p>25 A. No.</p>	<p style="text-align: right;">16</p> <p>1 behalf of NVLAP?</p> <p>2 A. Assessment.</p> <p>3 Q. Right?</p> <p>4 A. Yeah. Yes.</p> <p>5 Q. I mean, you don't take this lightly,</p> <p>6 do you?</p> <p>7 A. No.</p> <p>8 Q. There is an error in this, the</p> <p>9 attached -- if you'll flip through them, it's</p> <p>10 missing, I think, pages 14, and I think another</p> <p>11 page. I have another exhibit that I can get for</p> <p>12 you.</p> <p>13 A. Which, page 14?</p> <p>14 Q. If you'll flip through it, there's 17</p> <p>15 pages attached to it. You'll see --</p> <p>16 A. No, the even page was missing. You</p> <p>17 want to print it --</p> <p>18 Q. I'm saying I have the full thing. I</p> <p>19 am just marking -- here you go. (Handing.)</p> <p>20 This will be Exhibit 36. It's the</p> <p>21 full list of the evaluation from NVLAP.</p> <p>22 A. Yeah.</p> <p>23 Q. Okay. So, in 2016 this is the</p> <p>24 evaluation that you conducted at MAS, correct?</p> <p>25 A. Correct.</p>
<p style="text-align: right;">15</p> <p>1 Q. You did not?</p> <p>2 A. I did outside assessment. I don't</p> <p>3 have the power to accredit any laboratory. NVLAP,</p> <p>4 they have the power. I only report. My assessment</p> <p>5 is either determination whether they received</p> <p>6 accreditation or not. It was NVLAP; it's not me. I</p> <p>7 don't have that power.</p> <p>8 Q. Exhibit 35 is a document dated</p> <p>9 September 9, 2016, titled at the top "NVLAP Onsite</p> <p>10 Assessment."</p> <p>11 Do you see that?</p> <p>12 A. Yeah.</p> <p>13 Q. That's your signature on the bottom</p> <p>14 right?</p> <p>15 A. Correct.</p> <p>16 Q. What were you doing here?</p> <p>17 A. I did the -- I follow the protocol,</p> <p>18 NVLAP protocol, to assess the managerial and</p> <p>19 technical management of the laboratory, which now</p> <p>20 for this one is MAS. I'm assessing whether they are</p> <p>21 capable to following, to comply with the managerial</p> <p>22 requirement and technical requirement set out by</p> <p>23 NVLAP. That's my job.</p> <p>24 Q. And you were performing this</p> <p>25 analysis -- you were performing this analysis on</p>	<p style="text-align: right;">17</p> <p>1 Q. And my colleague, Mr. Placitella,</p> <p>2 would tell me this is God's way of telling me I've</p> <p>3 been talking too much.</p> <p>4 It includes -- again, back to Exhibit</p> <p>5 36, it includes on page 2 a section on proficiency</p> <p>6 testing, correct?</p> <p>7 A. Page 2, yeah, proficient test, yes.</p> <p>8 Yep.</p> <p>9 Q. Actually, it was the other document I</p> <p>10 was pointing to.</p> <p>11 A. Yes.</p> <p>12 Q. And you conducted proficiency testing</p> <p>13 of MAS in 2016 specific to the way they were doing</p> <p>14 the PLM?</p> <p>15 A. Let me make it clear: The proficient</p> <p>16 testing -- proficiency testing in the 3.4 clause is</p> <p>17 not what I did in the lab. That proficient testing</p> <p>18 is a formal testing issued by NVLAP twice a year,</p> <p>19 like M1 2015, M2 2016. This testing, you see the</p> <p>20 title --</p> <p>21 Q. I wasn't asking you about that</p> <p>22 document. I wasn't asking you about that document.</p> <p>23 MR. HYNES: Let him finish the</p> <p>24 answer, please.</p> <p>25 A. But you you're asking the testing I</p>

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<p style="text-align: right;">18</p> <p>1 did.</p> <p>2 Q. No, I didn't. I asked you on page 2,</p> <p>3 it lists requirements for --</p> <p>4 A. Okay.</p> <p>5 Q. Let's try to stick to the question</p> <p>6 I'm asking.</p> <p>7 A. Okay.</p> <p>8 Q. I said on page 2, it lists</p> <p>9 proficiency testing.</p> <p>10 A. Correct.</p> <p>11 Q. Okay. If we go to page 7 of Exhibit</p> <p>12 36, page 7 of 17 --</p> <p>13 A. Page 6?</p> <p>14 Q. Seven.</p> <p>15 A. Seven? Okay.</p> <p>16 Q. Section 5.3 there's a section called</p> <p>17 "Accommodation and Environmental Conditions,"</p> <p>18 correct?</p> <p>19 A. Yes.</p> <p>20 Q. And the Section 5.3.2 talks about</p> <p>21 "The laboratory shall have procedures for the use of</p> <p>22 blanks and asbestos-free material to determine the</p> <p>23 presence, quantity, and consistency of asbestos</p> <p>24 contamination in their analytical processes and have</p> <p>25 related procedures to control it."</p>	<p style="text-align: right;">20</p> <p>1 Go to the next page, page 8.</p> <p>2 A. Okay.</p> <p>3 Q. Test and calibration methods in</p> <p>4 method validation 5.4.1: "The laboratory shall use</p> <p>5 the US EPA interim method for the determination of</p> <p>6 asbestos in bulk insulation samples." That's found</p> <p>7 at 40 CFR Part 763.</p> <p>8 Do you see that?</p> <p>9 A. Yes, I do.</p> <p>10 Q. Again, you performed this evaluation?</p> <p>11 A. Yes, I did.</p> <p>12 Q. And NVLAP okayed it, correct?</p> <p>13 A. That's right. NVLAP okayed it.</p> <p>14 Q. Based on the information you reported</p> <p>15 back to them?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. Go to page 13 of 17.</p> <p>18 A. 13?</p> <p>19 Q. Yes.</p> <p>20 A. Okay. 13.</p> <p>21 Q. There's a section called "5.9"?</p> <p>22 A. Correct.</p> <p>23 Q. Assuring the quality of test and</p> <p>24 calibration methods.</p> <p>25 Do you see that?</p>
<p style="text-align: right;">19</p> <p>1 Do you see that?</p> <p>2 A. Yes, I do.</p> <p>3 Q. And you evaluated this in 2016 as</p> <p>4 okay, correct?</p> <p>5 A. Correct.</p> <p>6 Q. Which means it passes?</p> <p>7 A. Correct.</p> <p>8 Q. For NVLAP certification?</p> <p>9 A. Correct.</p> <p>10 Q. And that's something you evaluated</p> <p>11 personally?</p> <p>12 A. But not about accreditation. As I</p> <p>13 said, I only evaluate following this checklist.</p> <p>14 NVLAP has the power to determine whether they pass</p> <p>15 or not.</p> <p>16 Q. This was the -- so when it says</p> <p>17 "okay" here, that was based on the information that</p> <p>18 you reported to NVLAP, correct?</p> <p>19 A. Correct.</p> <p>20 Q. Right.</p> <p>21 And they said they passed?</p> <p>22 A. What I'm saying, the "okay" here only</p> <p>23 means they are in -- complied with this requirement;</p> <p>24 NVLAP said whether they pass or not.</p> <p>25 Q. Okay.</p>	<p style="text-align: right;">21</p> <p>1 A. I see that.</p> <p>2 Q. What does the letter C mean in this</p> <p>3 analysis?</p> <p>4 A. Comments.</p> <p>5 Q. Okay. Do you know where the comments</p> <p>6 are?</p> <p>7 A. Yes. I said 5.9.1, I think they</p> <p>8 comply with this requirement from minimum 10 percent</p> <p>9 QA, and listed here QA rate. The QA rate by this</p> <p>10 lab meet -- meets this minimum 10 percent</p> <p>11 requirement. Comments in the NVLAP system, comment</p> <p>12 is not a nonconformity; it is only document the</p> <p>13 assessor's observation, okay? Yeah.</p> <p>14 So comments is not criticism, what</p> <p>15 I'm saying is, just to show what the lab did is</p> <p>16 correct.</p> <p>17 Q. So the comments are your actual</p> <p>18 comments from your review at MAS in 2016?</p> <p>19 A. Yes.</p> <p>20 Q. So, when we get to 5.9.5, which is</p> <p>21 found at page 14 of 17, Section -- I'm sorry.</p> <p>22 A. 14, yes.</p> <p>23 Q. 5.9.5.</p> <p>24 A. Yep.</p> <p>25 Q. The section is labeled "The</p>

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<p style="text-align: right;">22</p> <p>1 laboratory shall maintain and summarize all of the</p> <p>2 quality assurance activities at least monthly to</p> <p>3 include..." and then it includes the list of things</p> <p>4 to include, correct?</p> <p>5 A. Correct.</p> <p>6 Q. One of those is, under I, is the</p> <p>7 total qualitative error rate of the laboratory.</p> <p>8 You see that?</p> <p>9 A. Yes, I saw that.</p> <p>10 Q. On the last page for comments, you</p> <p>11 marked "monthly summary well done"?</p> <p>12 A. Yes.</p> <p>13 Q. Okay. You were there specifically to</p> <p>14 determine MAS's compliance against a NVLAP checklist</p> <p>15 pertaining to their PLM methodology, the way they</p> <p>16 run their lab?</p> <p>17 A. Correct.</p> <p>18 Q. And NVLAP passed them, correct?</p> <p>19 A. Correct.</p> <p>20 Q. Based on the information you reviewed</p> <p>21 and provided to them and signed your name to?</p> <p>22 A. More so based on the reviewer. The</p> <p>23 NVLAP procedure is such. They sent a assessor to</p> <p>24 the lab informing the lab how the assessor's</p> <p>25 biography. The lab get to determine whether they</p>	<p style="text-align: right;">24</p> <p>1 A. Which report? You mean my MDL</p> <p>2 report?</p> <p>3 Q. The only report you've issued in this</p> <p>4 case.</p> <p>5 A. Okay. Yes.</p> <p>6 Q. That's Exhibit 3 to this deposition.</p> <p>7 A. Okay.</p> <p>8 Q. In your published papers, and I could</p> <p>9 show you examples of this if you'd like, you refer</p> <p>10 to dispersion staining and a Becke Line analysis as</p> <p>11 two competing ways to determine the refractive index</p> <p>12 of a mineral, correct?</p> <p>13 A. Incorrect.</p> <p>14 Q. Okay.</p> <p>15 A. I never said they are competing.</p> <p>16 Actually, they work in concert.</p> <p>17 Q. I'm going to hand you an abstract</p> <p>18 from 2005 that you published.</p> <p>19 A. Yes.</p> <p>20 Q. And this will be Exhibit 37. Let me</p> <p>21 get this taken care of.</p> <p>22 Are you familiar with this abstract?</p> <p>23 A. Yes.</p> <p>24 Q. What it says in the first paragraph</p> <p>25 is, "Although both Becke Line and dispersion</p>
<p style="text-align: right;">23</p> <p>1 accept this assessor or not. So, when they accept</p> <p>2 assessor, the assessor comes to the lab to do the</p> <p>3 assessment, then turning the assessment report like</p> <p>4 what I did.</p> <p>5 However, there's one more step. The</p> <p>6 NVLAP will assign another assessor to review the</p> <p>7 report. If the review report is okay, then NVLAP</p> <p>8 determine whether they will grant the accreditation</p> <p>9 or not. So, it's based on not only my report, but a</p> <p>10 second step, that the reviewer's review.</p> <p>11 Q. Okay. So somebody reviewed the</p> <p>12 information you provided?</p> <p>13 A. Correct.</p> <p>14 Q. And NVLAP approved MAS with regard to</p> <p>15 their PLM microscopy?</p> <p>16 A. Correct.</p> <p>17 Q. I want to turn back to the Becke Line</p> <p>18 discussion briefly.</p> <p>19 A. Okay.</p> <p>20 Q. If I understand it correctly, you</p> <p>21 agree that your report in no place discusses the</p> <p>22 application of a Becke Line methodology to</p> <p>23 dispersion staining analysis, but you believe that</p> <p>24 people should just know that if they're a quality</p> <p>25 PLM analyst?</p>	<p style="text-align: right;">25</p> <p>1 staining can be used to determine refractive index</p> <p>2 of a solid immersed in an immersion oil, dispersion</p> <p>3 staining has several advantages complementary to the</p> <p>4 Becke Line method that makes it a versatile</p> <p>5 alternative technique for refractive index</p> <p>6 determination using the immersion method," correct?</p> <p>7 A. Correct.</p> <p>8 Q. You're identifying dispersion</p> <p>9 staining as a completely separate technique for</p> <p>10 determining refractive indices, correct?</p> <p>11 A. Correct. It's not me to decide, to</p> <p>12 determine what it is because, in fact, it is one of</p> <p>13 the method to determine refract index.</p> <p>14 Q. So, going to Exhibit 13 -- do you</p> <p>15 have it in front of you?</p> <p>16 A. Yes.</p> <p>17 Q. Okay. Great.</p> <p>18 So going to Exhibit 13, if you'll</p> <p>19 turn to -- it's paginated as page 53.</p> <p>20 A. Okay.</p> <p>21 Q. Yeah.</p> <p>22 A. 53. Yes?</p> <p>23 Q. And this is a 2022 article that you</p> <p>24 published, I believe in "The Microscope," correct?</p> <p>25 A. Correct.</p>

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<p style="text-align: right;">26</p> <p>1 Q. At the top of page 53 you state,</p> <p>2 "There are three common techniques for assessing the</p> <p>3 sign and magnitude of the match/mismatch between a</p> <p>4 solid and its surrounding liquid: Becke Line,</p> <p>5 dispersion staining, and oblique illumination. Only</p> <p>6 the dispersion staining can meet the above specific</p> <p>7 needs for the routine PLM analysis of bulk asbestos</p> <p>8 samples in commercial environmental laboratories."</p> <p>9 That's what you wrote in 2022,</p> <p>10 correct?</p> <p>11 A. Correct.</p> <p>12 Q. You do not write anywhere in this</p> <p>13 paper that the Becke Line method can confirm where</p> <p>14 an analyst should be looking on a particle to</p> <p>15 determine the reference to analyze, correct?</p> <p>16 A. Correct.</p> <p>17 Q. In fact, this paragraph is the only</p> <p>18 time Becke is mentioned in that -- in this entire</p> <p>19 document?</p> <p>20 A. Correct.</p> <p>21 Q. Last year, in 2023, you published an</p> <p>22 article entitled "The Unification of Becke Line and</p> <p>23 Dispersion Staining Techniques for the Determination</p> <p>24 of Refractive Index of Non-Opaque Materials,"</p> <p>25 correct?</p>	<p style="text-align: right;">28</p> <p>1 A. Correct.</p> <p>2 Q. This is the first time, that you're</p> <p>3 aware of, that this methodology has ever been</p> <p>4 published, correct?</p> <p>5 MR. HYNES: Vague; overbroad.</p> <p>6 A. No. I only says that's the first</p> <p>7 time Dr. Gunter take the picture.</p> <p>8 Q. Are you aware of any other published</p> <p>9 literature saying that you should utilize the Becke</p> <p>10 Line method in conjunction with the dispersion</p> <p>11 staining method to determine the refractive index of</p> <p>12 a mineral?</p> <p>13 A. I don't have to.</p> <p>14 Q. So the answer is no?</p> <p>15 A. No.</p> <p>16 Q. Okay. Thank you.</p> <p>17 A. No.</p> <p>18 Q. If we continue to page 110, we see</p> <p>19 Figures 9 and Figures 11. Figure 11 is the</p> <p>20 three-mode dispersion staining, which I believe is</p> <p>21 the same thing that you brought with you on the</p> <p>22 first day of this deposition.</p> <p>23 A. That's correct.</p> <p>24 Q. Figure 9 are three separate images of</p> <p>25 what an analyst can find when conducting a Becke</p>
<p style="text-align: right;">27</p> <p>1 A. Correct.</p> <p>2 Q. Do you remember when this was</p> <p>3 published in 2023?</p> <p>4 A. I forgot which month.</p> <p>5 Q. This will be Exhibit 38.</p> <p>6 So, in this paper from 2023, if you'd</p> <p>7 turn to the third page, which is page 101 --</p> <p>8 A. Yes.</p> <p>9 Q. -- we see the three objective</p> <p>10 settings.</p> <p>11 A. Correct.</p> <p>12 Q. Central stop, annular stop, and then</p> <p>13 no -- no stop, or regular objective, correct?</p> <p>14 A. Correct.</p> <p>15 Q. This is the first published paper</p> <p>16 that I have seen from you that illustrates all three</p> <p>17 settings as opposed to just central stop and annular</p> <p>18 stop, correct?</p> <p>19 A. Correct.</p> <p>20 Q. If we continue in this paper to page</p> <p>21 108 --</p> <p>22 A. Yes.</p> <p>23 Q. -- there is a series of images which</p> <p>24 compare the CSDS against a Becke Line image,</p> <p>25 correct?</p>	<p style="text-align: right;">29</p> <p>1 Line analysis, correct?</p> <p>2 A. That's right.</p> <p>3 Q. And then if you'll turn to page 112,</p> <p>4 in the acknowledgments, you state, "The critical</p> <p>5 contributions from Professor Emeritus Mickey Gunter,</p> <p>6 University of Idaho, especially the superb suites of</p> <p>7 Becke Line and dispersion staining colors at various</p> <p>8 matching wavelengths that he meticulously obtained</p> <p>9 from a heating stage, have significantly improved</p> <p>10 this paper and are deeply appreciated.</p> <p>11 "I would like to also express my</p> <p>12 thanks to Dr. Bryan Bandli at RJ Lee Group for his</p> <p>13 detailed and constructive review of this</p> <p>14 manuscript."</p> <p>15 You see that?</p> <p>16 A. Yes.</p> <p>17 Q. I may be mistaken, but I thought last</p> <p>18 week when I depose you, you had said that you</p> <p>19 didn't know Bryan Bandli except for a meeting in</p> <p>20 Chicago that had occurred some years previously.</p> <p>21 MR. HYNES: Misstates prior</p> <p>22 testimony.</p> <p>23 A. No, I think the first time I met him</p> <p>24 is in Chicago; I did not say I have never interact</p> <p>25 with him after that.</p>

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<p style="text-align: right;">30</p> <p>1 Q. Okay. This paper in 2023, you</p> <p>2 collaborated with Dr. Gunter who you've known for 40</p> <p>3 years, and Bryan Bandli, correct?</p> <p>4 A. No. I sent him for review.</p> <p>5 Q. That's collaboration.</p> <p>6 A. That's right.</p> <p>7 Q. So the answer to my question is yes?</p> <p>8 A. I didn't -- I don't know what you</p> <p>9 mean "collaboration" but --</p> <p>10 Q. I'll rephrase it.</p> <p>11 For this paper in 2023, you worked</p> <p>12 with Bryan Bandli and Mickey Gunter to publish this</p> <p>13 paper, correct?</p> <p>14 A. I wrote the paper, then I sent him</p> <p>15 for review to get their feedback. That's it.</p> <p>16 Q. Okay. Have you maintained a working</p> <p>17 relationship with Matt Sanchez after your initial</p> <p>18 meeting with him that you discussed last week?</p> <p>19 A. I don't know how do you define a</p> <p>20 working relationship, but I did work with him.</p> <p>21 Okay.</p> <p>22 Q. What else have you worked with Matt</p> <p>23 Sanchez on?</p> <p>24 A. I think in June.</p> <p>25 Q. The Pittsburgh project?</p>	<p style="text-align: right;">32</p> <p>1 A. No.</p> <p>2 Q. Tell me about -- what is your view on</p> <p>3 Walter McCrone with regards to the proficiency of</p> <p>4 establishing standards applicable to polarized light</p> <p>5 microscopy?</p> <p>6 A. He is a well-respected scientist.</p> <p>7 Q. Did you know Dr. McCrone?</p> <p>8 A. Yes, I know him.</p> <p>9 Q. Do you rely on his work?</p> <p>10 MR. HYNES: Overbroad.</p> <p>11 A. What do you mean by "rely on his</p> <p>12 work"? I have never -- you see, the only thing I</p> <p>13 refer to his work is the 1967, the dispersion</p> <p>14 staining color chart. And that's the 1967 paper.</p> <p>15 And I don't remember which paper, I cite another</p> <p>16 reference from Dr. McCrone.</p> <p>17 Q. You understand Dr. McCrone to be a</p> <p>18 well-respected imminent scientist in his field, at</p> <p>19 least until he passed away, correct?</p> <p>20 A. Yes.</p> <p>21 Q. I'm going to hand you a publication</p> <p>22 by Walter McCrone called "Asbestos Identification."</p> <p>23 A. Yes, I know this.</p> <p>24 Q. You know this?</p> <p>25 A. Yeah.</p>
<p style="text-align: right;">31</p> <p>1 A. Correct.</p> <p>2 Q. I'm not talking about the Pittsburgh</p> <p>3 project. Other than the Pittsburgh project, what</p> <p>4 else have you ever worked with Matt Sanchez on?</p> <p>5 A. Never, I don't think so.</p> <p>6 Q. Other than the Pittsburgh project and</p> <p>7 this paper in 2023, what else have you ever worked</p> <p>8 with Bryan Bandli on?</p> <p>9 A. I think I sent him a paper about the</p> <p>10 dispersion staining color manuscript for him to</p> <p>11 review.</p> <p>12 Q. Okay.</p> <p>13 A. That's the only -- the other</p> <p>14 so-called working relationship.</p> <p>15 Q. Have you had interaction with any of</p> <p>16 the other scientists or microscopists at the RJ Lee</p> <p>17 Group other than Mr. Sanchez -- Dr. Sanchez and</p> <p>18 Dr. Bandli?</p> <p>19 A. Well, when we were working in the</p> <p>20 RJ Lee lab last June, like Monica, she was</p> <p>21 providing, like, logistic support for us.</p> <p>22 Q. Okay. Other than for the Pittsburgh</p> <p>23 project, other than that, have you ever had any</p> <p>24 other interactions with other scientists who you</p> <p>25 knew to be affiliated with the RJ Lee Group?</p>	<p style="text-align: right;">33</p> <p>1 Q. Okay. It's just an excerpt, but if</p> <p>2 you'd turn to the next page -- turn to the next</p> <p>3 page.</p> <p>4 A. Okay.</p> <p>5 Q. This is page 83 of this document.</p> <p>6 You see in the second full</p> <p>7 paragraph --</p> <p>8 By the way, did I mark this Exhibit</p> <p>9 39? This will be Exhibit 39.</p> <p>10 The second full paragraph states,</p> <p>11 "The matching wavelength is represented by color</p> <p>12 borders on the particle of interest."</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. Okay. What Dr. McCrone says here is</p> <p>16 that the matching wavelength, which is a term that</p> <p>17 Dr. McCrone invented, correct?</p> <p>18 A. No.</p> <p>19 Q. No? Okay. I thought --</p> <p>20 A. I said already, invented by a Russian</p> <p>21 microscopist called Cherkasov in 1930s.</p> <p>22 Q. Okay.</p> <p>23 A. Dr. McCrone referred to his paper.</p> <p>24 Q. All right. I thought maybe you had</p> <p>25 published something differently, so I'll re-ask the</p>

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<p style="text-align: right;">34</p> <p>1 question.</p> <p>2 "The matching wavelength" -- which is</p> <p>3 what it is that you're trying to identify in</p> <p>4 polarized light microscopy, correct?</p> <p>5 A. Correct.</p> <p>6 Q. -- "is represented by colored borders</p> <p>7 on the particle of interest."</p> <p>8 That's what he wrote, correct?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. Dr. McCrone did not write that</p> <p>11 you should utilize dispersion staining with a Becke</p> <p>12 Line analysis ever that you're aware of, correct?</p> <p>13 A. Correct.</p> <p>14 Q. All right. I'm changing topics now.</p> <p>15 A. Okay.</p> <p>16 Q. I'm going to ask you about</p> <p>17 Michel-Levy charts for just a moment, and then I</p> <p>18 think we can probably take a break. Okay?</p> <p>19 A. Okay.</p> <p>20 Q. All right. So, Michel-Levy charts</p> <p>21 are a method for determining the birefringence of a</p> <p>22 particle, correct?</p> <p>23 A. Correct.</p> <p>24 Q. It's not the only method, but it is a</p> <p>25 method, correct?</p>	<p style="text-align: right;">36</p> <p>1 A. Yeah.</p> <p>2 Q. What I'm saying is, scientifically,</p> <p>3 birefringence is determined by the refractive index</p> <p>4 of the particle that you're analyzing, correct?</p> <p>5 A. It was determined, but it's not</p> <p>6 principle of Michel-Levy chart. I have to make very</p> <p>7 clear about that.</p> <p>8 Q. We're missing each other entirely.</p> <p>9 A. Okay.</p> <p>10 Q. All right? Birefringence is a</p> <p>11 reflexion of what the refractive index of the</p> <p>12 measured particle is, just conceptually, right?</p> <p>13 A. Correct.</p> <p>14 Q. In the Michel-Levy charts, on the</p> <p>15 left-hand X axis, I guess it is, it's a vertical</p> <p>16 axis, right, the X axis? I always mess that up.</p> <p>17 But on the left-hand side, the Michel-Levy charts</p> <p>18 lists different values depending on the thickness of</p> <p>19 the particle?</p> <p>20 A. Correct.</p> <p>21 Q. Is this indicative of the proposition</p> <p>22 that various thicknesses of a particle can distort</p> <p>23 light at different rates and, therefore, have</p> <p>24 different refractive indices?</p> <p>25 A. No, not at all. You know the history</p>
<p style="text-align: right;">35</p> <p>1 A. Yes, one of the method.</p> <p>2 Q. I'm going to have to put this one on</p> <p>3 the screen. I think but this will be Exhibit 40.</p> <p>4 And it is just a -- I broke the computer. Make this</p> <p>5 bigger.</p> <p>6 Exhibit 40 is an example of a</p> <p>7 Michel-Levy color chart, correct?</p> <p>8 A. Correct.</p> <p>9 Q. So birefringence is determined by the</p> <p>10 relative refractive indices in the gamma and alpha</p> <p>11 directions, correct?</p> <p>12 A. Correct.</p> <p>13 Q. Okay.</p> <p>14 A. But, it was not used by Michel-Levy</p> <p>15 chart. Michel-Levy chart never used that.</p> <p>16 Q. No, I understand. The Michel-Levy</p> <p>17 charts don't calculate birefringence that way</p> <p>18 because it's a reference chart. You reference a</p> <p>19 viewed color and you compare it to the chart given</p> <p>20 other parameters, correct?</p> <p>21 A. There's a two way to determine</p> <p>22 birefringence: One is Michel-Levy chart, another is</p> <p>23 by determine the absolute refract index of gamma and</p> <p>24 alpha. This is two separate methods.</p> <p>25 Q. I very much understand that. Okay.</p>	<p style="text-align: right;">37</p> <p>1 of this chart was developed by petrologist. At that</p> <p>2 time, at early age, people don't measure</p> <p>3 birefringence by locating particle because when you</p> <p>4 examine the petrographic thick section, the standout</p> <p>5 thickness is 30 micron. So it's a uniform thickness</p> <p>6 on glass slide.</p> <p>7 Where you try to identify a rock,</p> <p>8 what type of rock, was it volcanic or sedimentary,</p> <p>9 you always cut a rock into 30-micron thick slices;</p> <p>10 therefore, you see this 30 is in the middle, not the</p> <p>11 standard thickness, to determine birefringence using</p> <p>12 the Michel-Levy chart.</p> <p>13 The chart has other thickness. It</p> <p>14 doesn't mean it would change the refract index, the</p> <p>15 thickness related to the birefringence. The thicker</p> <p>16 the thickness, the higher the birefringence.</p> <p>17 Q. Okay.</p> <p>18 A. Another important issue is --</p> <p>19 Q. Go ahead. I'll leave that up.</p> <p>20 A. Here it says, like in the down</p> <p>21 indicate .005. That's the birefringence. It could</p> <p>22 be the mineral 1.65 gamma, alpha 1.60.</p> <p>23 Q. Um-hum.</p> <p>24 A. It could be another mineral. It's</p> <p>25 alpha is 1.50, but its gamma is 1.55. So, this</p>

10 (Pages 34 to 37)

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<p style="text-align: right;">38</p> <p>1 chart is unrelated to the gamma and the alpha. 2 Q. Okay. Because that's a separate 3 method of calculating -- 4 A. That's right. 5 Q. -- birefringence? 6 Doctor, you have to let me finish my 7 question. 8 A. Okay. Sorry. 9 Q. You can continue. 10 A. So this chart was developed 11 specifically for the petrologist looking for the 12 thin section. It's not for the particle 13 identification because you don't know the accurate 14 particle thickness. 15 Q. Okay. So, let's talk about 16 thicknesses and refractive indexes for a minute. 17 A. Um-hum. 18 Q. You've seen that I use reading 19 glasses. Reading glasses distort the light going to 20 your eyes, correct? 21 A. That's right. 22 Q. They have a refractive index? 23 A. Correct. 24 Q. The glass in your reading glasses has 25 a refractive index?</p>	<p style="text-align: right;">40</p> <p>1 A. Yes. 2 Q. And each of them have the same 3 refractive index. Okay? You with me so far? 4 A. Yes. 5 Q. Would the bundle not distort the 6 light more than a thinner section of that same 7 bundle? 8 A. Yes. 9 Q. Okay. Isn't the refractive index a 10 measurement of the degree to which light is 11 distorted through the particle? Isn't that what it 12 is? 13 A. No. 14 Q. No? 15 A. "Distorted" is not a "terminolog" in 16 this science; reflection is. So, the light is 17 refracted by the fiber or the individual component 18 of a fiber bundle; therefore, it is a fact by the 19 interface between the fibers because the interface 20 angle would affect the reflection. If happen, the 21 interface incident angle to interface is at the 22 critical angle, or exceeding the critical angle, 23 that wavelength will be internally totally refracted 24 out of the microscope. 25 So, it's like, for example, the blue</p>
<p style="text-align: right;">39</p> <p>1 A. Correct. 2 Q. If I make that glass thicker, it will 3 distort the light more, correct? 4 A. Depending the refract index of the 5 glass. 6 Q. Right. 7 A. If the refract index is the same, no, 8 the reflection angle is the same. 9 Q. Right. 10 A. It does not change the refract index 11 of the glass. 12 Q. When you change a prescription in 13 your glasses, you are changing the refractive index 14 of what is being fed to your light -- to your eyes 15 through the glasses, correct? 16 A. No, no, no. The "prescript" lens is 17 the curvature at the angle of incident and 18 refracted. So the thickness, if the same material, 19 same glass, whether it's glass, or later which 20 people use polycarbonate, the plastic, okay, and the 21 plastic has a high refractive index; therefore, make 22 the lens thinner, which is good for the wearer. 23 Q. Okay. If you have a mineral that is 24 bundled, where there's multiple individuals of that 25 minerals stacked on top of each other.</p>	<p style="text-align: right;">41</p> <p>1 light has 86.5 degree of critical angle for the 1.55 2 oil and the typical 1866 chrysotile, okay? For the 3 red light is 83.5 degree. Whenever it interface, 4 the angle with the incident light is at the critical 5 angle; for example, for the blue wavelength, which 6 are 86.5 degree, if I remember correctly, then that 7 blue wavelength will be totally refracted. Okay? 8 Q. A fiber of a given refractive index 9 will distort light differently than a bundle of 10 those same fibers even if those same fibers all have 11 the same refractive index, direct? 12 MR. HYNES: Incomplete hypothetical. 13 A. Yes and no. It doesn't matter it's a 14 fiber bundle or single fiber. Even if single fiber. 15 The best example is the glass. See, in order to 16 meet NVLAP requirement for asbestos lab, I develop a 17 method to calibrate the oil, use the Cargille glass 18 standards. The glass are single particles, however, 19 the edge, sometime they're very steep, very sharp; 20 therefore, a single particle will show distorted 21 dispersion staining color. That's why my method has 22 been widely used by asbestos labs. 23 So when I go to the lab, they ask me: 24 How come this glass is supposed to be uniform 25 refract index, for example, calibrate 1.550 is</p>



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<p style="text-align: right;">42</p> <p>1 immersion oil, use it at 1.55 glass? They're</p> <p>2 supposed to match very well. However, how come I</p> <p>3 saw a range of dispersion staining color? Like one</p> <p>4 of the picture I took in Pittsburgh.</p> <p>5 Now explain to them: Well, it is the</p> <p>6 total reflection. If a single particle, if the</p> <p>7 interface -- for example, what I'm saying is, like,</p> <p>8 this steep, the incident light coming from the light</p> <p>9 source, if the angle is exceeding 86 or 87 degree,</p> <p>10 then the blue wavelength will be totally reflected.</p> <p>11 In that case, the dispersion staining</p> <p>12 color was distorted because some component of the</p> <p>13 wavelengths is missing due to the total reflection;</p> <p>14 therefore, it doesn't matter it's a single fiber or</p> <p>15 fiber bundle. It's all determined by the</p> <p>16 "morpholog," by the interface angle.</p> <p>17 MR. BRALY: Should we take a break</p> <p>18 now?</p> <p>19 MR. HYNES: Sure.</p> <p>20 (Recess: 10:11 a.m. to 10:18 a.m.,</p> <p>21 Eastern Standard Time.)</p> <p>22 BY MR. BRALY:</p> <p>23 Q. Dr. Su?</p> <p>24 A. Okay.</p> <p>25 Q. One of the myriad complaints you have</p>	<p style="text-align: right;">44</p> <p>1 of the chemical composition in the crystal structure</p> <p>2 of the mineral you're looking at; true?</p> <p>3 A. Yes. The TEM method can determine</p> <p>4 the elemental composition of a object by EDX</p> <p>5 technique.</p> <p>6 Q. So you could have assurances that</p> <p>7 what it is that you're looking at is the same as the</p> <p>8 chemical composition of what it is you believe it is</p> <p>9 that you're looking at, right?</p> <p>10 A. Correct.</p> <p>11 Q. Your report seems to suggest that the</p> <p>12 fiber lengths associated with chrysotile will be</p> <p>13 much longer, on the order of, oh, in some cases, 30,</p> <p>14 40, 50 more microns in length, correct?</p> <p>15 A. Correct.</p> <p>16 Q. Are you aware that MAS has conducted</p> <p>17 a TEM analysis of Calidria and found that that's not</p> <p>18 correct?</p> <p>19 A. I'm not aware, because --</p> <p>20 Q. I'm handing you what's marked as</p> <p>21 Exhibit 41.</p> <p>22 I have a copy for you, Kevin. If you</p> <p>23 can hand that down to Mr. Hynes.</p> <p>24 Exhibit 41 is an October 5, 2023, TEM</p> <p>25 analysis of length dispersions of sample Calidria.</p>
<p style="text-align: right;">43</p> <p>1 with Dr. Longo's PLM testing has to do with the size</p> <p>2 of the particles and their conformity with each</p> <p>3 other.</p> <p>4 You follow what I'm saying?</p> <p>5 A. Yes, I did.</p> <p>6 Q. And I guess the top-line criticism</p> <p>7 here is that if it were truly chrysotile that he's</p> <p>8 finding in these samples, that the chrysotile itself</p> <p>9 would not match the size of the talc particles in</p> <p>10 the samples?</p> <p>11 A. Yes, that was my opinion.</p> <p>12 Q. Okay. And that is based on a milled</p> <p>13 sample of -- this is a milled sample of 1886 -- or</p> <p>14 1866 SRM chrysotile, correct?</p> <p>15 A. Yes and no, because I examine the</p> <p>16 Calidria chrysotile-spiked sample.</p> <p>17 Q. Um-hum.</p> <p>18 A. Okay.</p> <p>19 Q. Okay. So it's --</p> <p>20 A. It's consistent. Okay. Whether it</p> <p>21 is 1866 or Calidria, the particle size is not as</p> <p>22 small as the talc.</p> <p>23 Q. You would agree that there are</p> <p>24 certain advantages that transmission electron</p> <p>25 microscopy can provide over TEM, such as a spectra</p>	<p style="text-align: right;">45</p> <p>1 A. Yes, I look at the report.</p> <p>2 Q. You're seeing a lot of lengths</p> <p>3 reported here that fall under 10 microns in length,</p> <p>4 correct?</p> <p>5 A. Correct.</p> <p>6 Q. That's inconsistent with what you</p> <p>7 reported in your PowerPoint, correct?</p> <p>8 A. Also inconsistent with the work I did</p> <p>9 in Pittsburgh. I took SEM picture, those structure,</p> <p>10 the SG210 of the SEM, which is equally accurate for</p> <p>11 the length determination. They are much larger than</p> <p>12 the report by MAS.</p> <p>13 Q. Okay. Well this is page 4 of Exhibit</p> <p>14 41, if you look at the monitor. You could do it on</p> <p>15 your page, too, if you wish. But it's the first TEM</p> <p>16 photomicrograph here. We see a bundle of what's</p> <p>17 reported as RG210 -- there is no RG210, so it's</p> <p>18 probably a typo. SG210.</p> <p>19 -- top 001 chrysotile reported length</p> <p>20 of 2.7 microns.</p> <p>21 Do you see that?</p> <p>22 A. Yes, I saw that.</p> <p>23 Q. That's inconsistent with what you</p> <p>24 found in your Pittsburgh project with Mr. Sanchez</p> <p>25 and Mr. Bandli, correct?</p>

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<p style="text-align: right;">46</p> <p>1 MR. HYNES: Form.</p> <p>2 A. Correct.</p> <p>3 Q. If we scroll ahead, it's page 12 of</p> <p>4 the PDF but it's the next image here, and this is</p> <p>5 reported as Calidria RG144, which is a different</p> <p>6 grade than SG210.</p> <p>7 You see that?</p> <p>8 A. I saw that.</p> <p>9 Q. Which is a -- you would agree this is</p> <p>10 a bundle of chrysotile fibers, right, presuming the</p> <p>11 EDXA all matches in the chrysotile spectrum would</p> <p>12 match, that this is visually a bundle of fibers,</p> <p>13 correct?</p> <p>14 A. I don't know how accurate this image</p> <p>15 is. I would love to look at fiber myself.</p> <p>16 Q. Okay. But this is reporting RG144 as</p> <p>17 a length of 2.1 microns, correct?</p> <p>18 A. Correct.</p> <p>19 Q. Which is inconsistent with what you</p> <p>20 found by polarized light with Matt Sanchez, correct?</p> <p>21 A. By the way, you said is 2.1 micron.</p> <p>22 Where is the scale bar? Without scale bar, I cannot</p> <p>23 say it is 2.1 micron.</p> <p>24 Q. You don't trust the software utilized</p> <p>25 with TEM to --</p>	<p style="text-align: right;">48</p> <p>1 manufacturers of the software, I suppose, but...</p> <p>2 A. And didn't even say what</p> <p>3 magnification on this -- the TEM --</p> <p>4 Q. Do you remember the question I asked</p> <p>5 you?</p> <p>6 A. Yeah.</p> <p>7 Q. The question I was asking you was 2.1</p> <p>8 microns in length would be inconsistent with what</p> <p>9 you found with Dr. Sanchez, correct?</p> <p>10 MR. HYNES: Form.</p> <p>11 A. What I'm saying is --</p> <p>12 Q. Just answer my question, please.</p> <p>13 A. I'm answering.</p> <p>14 Q. Thank you.</p> <p>15 Is the answer, yes, it's inconsistent</p> <p>16 with what you found with Dr. Sanchez --</p> <p>17 MR. HYNES: Form.</p> <p>18 A. Or their data is not consistent with</p> <p>19 Dr. Sanchez.</p> <p>20 Q. Very good.</p> <p>21 A. It's not Dr. Sanchez inconsistent</p> <p>22 with him, MAS. Okay.</p> <p>23 Q. On page 28 of the PDF, we see another</p> <p>24 image. This is reported as Calidria RG210 again. I</p> <p>25 believe that's a typo because I don't think there</p>
<p style="text-align: right;">47</p> <p>1 A. No. The TEM -- no, I'm not say I'm</p> <p>2 not trusting it, but I have to look at the scale</p> <p>3 bar.</p> <p>4 Q. Sure. Sounds like you're saying</p> <p>5 you're not trusting it.</p> <p>6 A. And also, one issue here is if you</p> <p>7 look at that, the width is .1.</p> <p>8 Q. Sure.</p> <p>9 A. The length at 2.1.</p> <p>10 Q. Um-hum.</p> <p>11 A. You said the length 21 times than the</p> <p>12 width.</p> <p>13 Q. Sure.</p> <p>14 A. Does that look to you like 21 times?</p> <p>15 Q. Yes, it does.</p> <p>16 A. I can measure off the screen --</p> <p>17 Q. I think anyone with a set of eyes can</p> <p>18 see that's about 21 times the length.</p> <p>19 A. Doesn't look that to me.</p> <p>20 Q. Okay.</p> <p>21 A. Okay. I think the ratio, the aspect</p> <p>22 ratio, is larger than 21.</p> <p>23 Q. Okay.</p> <p>24 A. Um-hum.</p> <p>25 Q. All right. Take it up with the</p>	<p style="text-align: right;">49</p> <p>1 was ever an RG210. But it's reported as the middle.</p> <p>2 This is 002 chrysotile reported as</p> <p>3 1.7 microns by .18 microns.</p> <p>4 Do you see that?</p> <p>5 A. I saw that.</p> <p>6 Q. You agree visually that would be a</p> <p>7 bundle, correct?</p> <p>8 A. Yes.</p> <p>9 Q. Okay. So, as far as size</p> <p>10 distribution goes, you and Dr. Sanchez and</p> <p>11 Dr. Bandli did not find sizes of Calidria that were</p> <p>12 in the size range of what I just showed you,</p> <p>13 correct?</p> <p>14 A. Incorrect. We found similar size,</p> <p>15 but we found size much bigger than that.</p> <p>16 Q. Okay.</p> <p>17 A. Also, at a time USP study, that is</p> <p>18 the best particle size distribution of the spiked</p> <p>19 chrysotile versus talc. Actually, you cannot use a</p> <p>20 single, or several images to show the particle size</p> <p>21 distribution. They plotted the two curves. The</p> <p>22 peak of talc is smaller than the peak of chrysotile.</p> <p>23 Q. Okay.</p> <p>24 A. That is the true particle size</p> <p>25 distribution.</p>

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<p style="text-align: right;">50</p> <p>1 Q. Listen, if I want you to talk about 2 the USP study, I'll ask you about the USP study. 3 Okay? 4 A. Yeah. 5 Q. So, just so I understand this 6 correctly, you did find Calidria samples in what you 7 evaluated that were under 10 microns in length, 8 correct? 9 A. Yes. 10 Q. The USP particle size study that 11 you're referencing, this was primarily undertaken by 12 Dr. Sanchez, correct? 13 A. I don't know. I really don't know. 14 I don't know who perform, but I know one of the 15 probably investigator is Julie Pier, okay? I have 16 never communicate with Dr. Sanchez about USP study. 17 Q. You don't know if Dr. Sanchez was 18 involved in the USP study? 19 A. No, not at all. I know Julie Pier 20 is. 21 Q. Do you know what Julie Pier's role 22 has been relative to talc manufacturing interests? 23 A. No. 24 Q. You don't? 25 A. Oh, I know she used to work for</p>	<p style="text-align: right;">52</p> <p>1 you crop image or not. You see the top particle on 2 this two images, they are similar. That is 3 impossible, which means the field of view scale is 4 incorrect. 5 Q. You said that the size of the 6 particle is -- you understand that these are 7 different particles in each of these photographs, 8 right? 9 A. They are different samples, but they 10 are talc. There's no difference between the 11 particle, the identity of particle. 12 Q. Fine. But you said that based on the 13 size of the image that's presented here -- first of 14 all, you don't know what the field of view for 15 either of these images was, correct? 16 A. I know because I measure the -- 17 Q. Image? 18 A. -- image. 19 Q. But the image was cropped. You don't 20 know what the total field of view was that the 21 microscopist was looking at, do you? 22 A. However -- 23 Q. No, just answer my question first, 24 then do your "however." 25 A. Okay.</p>
<p style="text-align: right;">51</p> <p>1 like -- 2 Q. Imerys? 3 A. Yes. Correct. 4 Q. Right. 5 A. Yeah. 6 Q. I want to ask you about a particular 7 slide in your PowerPoint. And this is page 45 of 8 Exhibit 3, but it's page 25 of your PowerPoint. 9 Okay? 10 A. Okay. 11 Q. You've entitled this slide "MAS's 12 Inability to Create Scale Bars." 13 You see that? 14 A. Yes, I did. 15 Q. And you've taken the selected image 16 for both of these photographs and extrapolated out 17 that that image represents the entire field of view 18 available to the microscopist, correct? 19 A. Correct. 20 Q. Again, you're unaware of whether or 21 not the software utilized by MAS allows the analyst 22 to take a screen capture of just the area they're 23 focused on as opposed to the entire field of view, 24 correct? 25 A. Yes and no. First, it doesn't matter</p>	<p style="text-align: right;">53</p> <p>1 Q. Answer my question. 2 A. No. 3 Q. Okay. Now you could do your 4 "however." 5 A. Yes. They mark the particle size. 6 Q. Right. 7 A. Which is indicative, at least the 8 current field of view. This two field of view based 9 on their own data, not my data. For example, the 10 first one, the width of the particle was marked 46.7 11 micron, micrometer; therefore, you can calculate the 12 field of view whether it's cropped or not. So this 13 814 is based on the MAS data. 14 Q. It's based on a visualization based 15 on the size of the cropped image that you were given 16 to look at. 17 A. You don't know it's cropped. Do you 18 know? 19 Q. You don't know either. 20 A. That's right. 21 Q. But what I'm saying -- I do know, 22 actually, but you don't know. But you're basing 23 that 814 on a visual extrapolation of what was 24 reported as 46.7 taken over the width of the image 25 that was provided to you, correct?</p>

14 (Pages 50 to 53)



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<p style="text-align: right;">54</p> <p>1 A. Correct.</p> <p>2 Q. You don't know if that was the whole</p> <p>3 field of view?</p> <p>4 A. I don't have to.</p> <p>5 Q. But you don't.</p> <p>6 A. I don't.</p> <p>7 Q. Thank you.</p> <p>8 The same is true for the bottom</p> <p>9 photo. You have a scale bar there, and you utilize</p> <p>10 that scale bar across the width of the image that</p> <p>11 was given to you, but you don't know if that was the</p> <p>12 entire field of view that the analyst was looking</p> <p>13 at, correct?</p> <p>14 A. Correct.</p> <p>15 Q. Thank you.</p> <p>16 A. However --</p> <p>17 Q. Go ahead. You're entitled to do your</p> <p>18 "howevers."</p> <p>19 A. I was not based on my evaluation</p> <p>20 simply by looking at the scale bar or the particle</p> <p>21 size marked by MAS. I also base my observation, my</p> <p>22 opinion, on the size of the talc particle in both</p> <p>23 image. If those two field of view is so much</p> <p>24 different, how could the talc particle there look</p> <p>25 similar?</p>	<p style="text-align: right;">56</p> <p>1 to put this on the screen here. This is Exhibit 3</p> <p>2 of your -- this is Exhibit 3. This is page 11 of</p> <p>3 your report. Okay? You have this paragraph at the</p> <p>4 bottom of page 11.</p> <p>5 You state, "As shown in the table</p> <p>6 above, from 2020 to 2024, over a five-year span</p> <p>7 using various different sample preparation</p> <p>8 techniques as described in MAS's expert reports, the</p> <p>9 heavy liquid separation sample preparation procedure</p> <p>10 produces a series of extremely inconsistent light</p> <p>11 fractions ranging from 13.4 percent to 24.2 percent</p> <p>12 in talcum powder products, which further produced</p> <p>13 chrysotile concentrations ranging from .003 percent</p> <p>14 to .01 percent.</p> <p>15 "For baby powder samples consisting</p> <p>16 of 99.9 percent talcum powder, which should be in</p> <p>17 the heavy fraction, how is it possible that the</p> <p>18 light fraction more than 1 percent?"</p> <p>19 You see that?</p> <p>20 A. I see that.</p> <p>21 Q. Who in the world told you that baby</p> <p>22 powder was 99.9 percent talcum powder? Who told you</p> <p>23 that?</p> <p>24 A. The report told me.</p> <p>25 Q. You know that baby powder has never</p>
<p style="text-align: right;">55</p> <p>1 See, that's another criteria you can</p> <p>2 tell whether the image was cropped at the same rate.</p> <p>3 So, this thing were indicate whether it's a full</p> <p>4 field of view or a cropped field of view. The</p> <p>5 particles look the same, which means they are either</p> <p>6 full field of view or cropped at the same rate.</p> <p>7 That is my conclusion.</p> <p>8 Again, here is -- the FOV, I'm</p> <p>9 talking about image field of view. You see? The</p> <p>10 image have a field of view. It doesn't matter the</p> <p>11 image had been cropped or not.</p> <p>12 Q. Those two images that you utilized</p> <p>13 there are different images taken from different</p> <p>14 reports, correct?</p> <p>15 A. Yeah. Yes. One is 71095, 71940.</p> <p>16 Q. They were taken from different</p> <p>17 particles. Regardless of what you think the</p> <p>18 particle is, they're not the same particle, correct?</p> <p>19 A. They are. They're both -- the title</p> <p>20 of the report is the baby powder.</p> <p>21 Q. The specific particle being viewed is</p> <p>22 not the same particle in both photographs?</p> <p>23 A. They are different baby powder</p> <p>24 bottle.</p> <p>25 Q. I want to ask you about -- I'm going</p>	<p style="text-align: right;">57</p> <p>1 been 99.9 percent talc.</p> <p>2 A. Well, if the chrysotile concentration</p> <p>3 reported here is point -- less than .01, and they</p> <p>4 did not identify any other phases component in the</p> <p>5 baby powder, now, what else could be?</p> <p>6 Q. Your criticism is based on the idea</p> <p>7 that Johnson's Baby Powder was 99.9 percent talc?</p> <p>8 A. No, I was based on the MAS report.</p> <p>9 Q. Okay.</p> <p>10 A. Because they did not indicate the</p> <p>11 other phases in this baby powder; therefore, you</p> <p>12 minus the chrysotile concentration, you end up 99.</p> <p>13 Q. Have you ever prepared a heavy liquid</p> <p>14 separation sample?</p> <p>15 A. I did.</p> <p>16 Q. When?</p> <p>17 A. When I was working for Hercules for</p> <p>18 certain project.</p> <p>19 Q. Did you do this one time or was this</p> <p>20 a routine part of your job?</p> <p>21 A. Actually, more than one time.</p> <p>22 Q. Two times, or is this something --</p> <p>23 like something you did thousands --</p> <p>24 A. Oh, much more than that. In my</p> <p>25 20-years career in Hercules, we did so many project.</p>

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<p style="text-align: right;">58</p> <p>1 Some project involved the heavy liquid separation.</p> <p>2 Q. Have you ever done heavy liquid</p> <p>3 separation for the purposes of evaluating minerals</p> <p>4 in talc?</p> <p>5 A. No.</p> <p>6 Q. So, your statement here is that "For</p> <p>7 baby powder samples consisting of 99.9 percent</p> <p>8 talcum powder, which should be in the heavy</p> <p>9 fraction, how is it possible for the light fraction</p> <p>10 more than 1 percent? It is beyond comprehension</p> <p>11 that these ridiculous two-digit light fraction</p> <p>12 results did not make MAS realize that something was</p> <p>13 grossly wrong with each and every sample preparation</p> <p>14 that it tried over the course of five years."</p> <p>15 Do you see that?</p> <p>16 A. I saw that.</p> <p>17 Q. So, for this to really be ridiculous,</p> <p>18 you would have to conclude -- or you have to start</p> <p>19 from the position that the baby powder was, indeed,</p> <p>20 99.9 percent talc, right?</p> <p>21 MR. HYNES: Misstates testimony.</p> <p>22 A. No. I said this report did not</p> <p>23 report a third phase in the baby powder --</p> <p>24 Q. Are you saying p-h-a -- I'm sorry.</p> <p>25 Are you "phase" like p-h-a-s-e?</p>	<p style="text-align: right;">60</p> <p>1 A. No, I'm not.</p> <p>2 Q. Okay. So because MAS didn't report</p> <p>3 the amount of nickel or carbonates or whatever else</p> <p>4 might be present, you took that to mean that it was</p> <p>5 chrysotile and talc and nothing else?</p> <p>6 A. That's right.</p> <p>7 Q. Okay. Let me ask you about -- let me</p> <p>8 get this off. Actually, no, I'm going to leave this</p> <p>9 up there. I'm going to take away the highlight. I</p> <p>10 like your cars picture, by the way.</p> <p>11 There is a section of your report,</p> <p>12 this is page 92 of Exhibit 3 which is page 72 of</p> <p>13 your PowerPoint.</p> <p>14 A. I saw that.</p> <p>15 Q. All right. You want to take a second</p> <p>16 to go there?</p> <p>17 A. Yes. I'm on this page.</p> <p>18 Q. So, I just have some questions about</p> <p>19 this formula. This formula is N, meaning the sample</p> <p>20 size that is large enough to attain the specified</p> <p>21 maximum allowable error in confidence level is equal</p> <p>22 to -- and I could read this out but it's not going</p> <p>23 to make any sense in the record. But regardless,</p> <p>24 anyone who's following along with Exhibit 3 at page</p> <p>25 72 of the PowerPoint can find the same formula.</p>
<p style="text-align: right;">59</p> <p>1 A. Yeah.</p> <p>2 Q. Continue, please.</p> <p>3 A. -- component. A third component in</p> <p>4 the product, now which only identify the chrysotile</p> <p>5 and talc.</p> <p>6 If the report said there is a third</p> <p>7 or fourth components in the sample, then the 99</p> <p>8 conclusion was incorrect; however, it says the only</p> <p>9 other components in this sample is chrysotile,</p> <p>10 therefore, what else could be?</p> <p>11 Q. Okay.</p> <p>12 A. Also, they never said in the light</p> <p>13 fraction besides chrysotile, there's other things</p> <p>14 than talc.</p> <p>15 Q. Okay. Have you ever asked Matt</p> <p>16 Sanchez about how much talc there is in baby powder?</p> <p>17 A. No.</p> <p>18 Q. Ever read any Johnson &amp; Johnson</p> <p>19 documents to determine how much talc they have in</p> <p>20 baby powder?</p> <p>21 A. No.</p> <p>22 Q. Are you aware of industry documents</p> <p>23 that indicate that for something to be a consumer</p> <p>24 talc product, it only has to have at least 90</p> <p>25 percent talc in it? Are you aware of this?</p>	<p style="text-align: right;">61</p> <p>1 For N, what is the sample size that</p> <p>2 you're using when you conduct this analysis? Is it</p> <p>3 the slide, is it the --</p> <p>4 A. The total amount of the sample to be</p> <p>5 analyzed.</p> <p>6 Q. So, total amount of material under</p> <p>7 the slide?</p> <p>8 A. Not -- if they put all the amount of</p> <p>9 the sample on the slides, it is. What I am saying,</p> <p>10 if the .000017 gram sample they took out from the</p> <p>11 bottle, if they spread all sample onto slide, yes,</p> <p>12 they are analyzing that amount.</p> <p>13 Q. Okay. Is this corrected for, like,</p> <p>14 the weight of the cover slip and everything else, or</p> <p>15 is this -- I mean, does that make sense you would do</p> <p>16 that? Never mind, that's a dumb question. Don't</p> <p>17 answer my dumb questions.</p> <p>18 Then -- is this reported in, then, a</p> <p>19 percentage by weight or does this end up being</p> <p>20 reported as total grams or...</p> <p>21 A. Actually, if you look at the report,</p> <p>22 the report said they sampled that amount of the</p> <p>23 sample for this analysis.</p> <p>24 Q. Have you ever seen a calculation like</p> <p>25 this performed on something relative to PLM</p>

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<p style="text-align: right;">62</p> <p>1 microscopy of particles like we're talking about?</p> <p>2 A. I can only said when I was working at</p> <p>3 research center of Hercules, when we received some</p> <p>4 project, that's the first thing we do: How much</p> <p>5 sample we should analyze to reach the 95 perfect</p> <p>6 confidence level. This is the basic procedure of</p> <p>7 the determine a component system. Okay.</p> <p>8 Q. Did you perform this calculation</p> <p>9 every -- first of all, have you performed this</p> <p>10 calculation relative to your opinions in this case?</p> <p>11 A. I performed this calculation using</p> <p>12 MAS standard.</p> <p>13 Q. Okay.</p> <p>14 A. Which showed in slide -- yes, I did,</p> <p>15 although I did not put on this PowerPoint because</p> <p>16 the number is too large. What I am saying is, if</p> <p>17 you plug this .000017 into this equation and you</p> <p>18 require -- actually, I'm very -- what I'm saying, I</p> <p>19 allow them probably maximum allowed error, probably</p> <p>20 5 percent, 10 percent. Anybody can do the</p> <p>21 calculation and turn out the confidence level is so</p> <p>22 small, it just should not be used.</p> <p>23 Q. So what I -- I want to start with a</p> <p>24 couple of do you agrees with me, and then we're</p> <p>25 going to go on to the question I'm really asking</p>	<p style="text-align: right;">64</p> <p>1 provided to us before you testify again, I think</p> <p>2 we'll be okay. I'm not trying to make a big deal</p> <p>3 out of this.</p> <p>4 In fact, let's go ahead and take</p> <p>5 five. I am maybe close to being done here.</p> <p>6 (Recess: 10:54 a.m. to 11:04 a.m.,</p> <p>7 Eastern Standard Time.)</p> <p>8 BY MR. BRALY:</p> <p>9 Q. Dr. Su, I had a question about the</p> <p>10 materials that you produced after you had authored</p> <p>11 your report from the Pittsburgh project. There is a</p> <p>12 folder in what you produced called "SEM Images -</p> <p>13 Thermo Apereo," A-p-e-r-e-o?</p> <p>14 A. Yes.</p> <p>15 Q. And in that there are a series of</p> <p>16 images. And I'm just going to do a couple of these.</p> <p>17 The first one that I'm going to show you is marked</p> <p>18 as Exhibit 42. This is one of the images --</p> <p>19 A. Yes.</p> <p>20 Q. -- that you produced.</p> <p>21 What is this?</p> <p>22 A. This is a talc -- I will have to look</p> <p>23 at the --</p> <p>24 MR. HYNES: Could you just read off</p> <p>25 the file name?</p>
<p style="text-align: right;">63</p> <p>1 you. Okay?</p> <p>2 A. Okay.</p> <p>3 Q. You agree with me that nowhere in</p> <p>4 your report do you actually show the variable values</p> <p>5 that you use in performing the calculation that</p> <p>6 you're talking about?</p> <p>7 A. I did not document that.</p> <p>8 Q. Thank you.</p> <p>9 You can provide that, correct?</p> <p>10 A. Correct.</p> <p>11 Q. You report that your calculation</p> <p>12 ended up far below 50 percent?</p> <p>13 A. Correct.</p> <p>14 Q. That's at the bottom of page 73 of</p> <p>15 your slide slow.</p> <p>16 Are you able to tell me what values</p> <p>17 you used for variables in this formula, meaning the</p> <p>18 value for N, the value for P, and so forth and so</p> <p>19 on, and if not, can you provide that data to us?</p> <p>20 A. Of course I can.</p> <p>21 Q. Are you able to recall it now, the</p> <p>22 values that you used for --</p> <p>23 A. No, I cannot recall from my head.</p> <p>24 Q. Okay. Clearly we're going to make a</p> <p>25 request for that data. As long as that can be</p>	<p style="text-align: right;">65</p> <p>1 MR. BRALY: Yeah. The file name is</p> <p>2 "Wet-Sieved" -- is it "sieved" or "sieved"?</p> <p>3 A. Sieve.</p> <p>4 Q. "Wet-Sieved Talc SG210 1,000 SE_ETD."</p> <p>5 A. Yeah, that is SG210 spiked talc</p> <p>6 sample.</p> <p>7 Q. What does "wet-sieved" mean? What</p> <p>8 did you do to the sample? ^</p> <p>9 A. The wet sieve is using the powder,</p> <p>10 they put in the water and then sieve it, because the</p> <p>11 water make it easier for the particle to pass</p> <p>12 through the holes of the sieve. Okay? That is more</p> <p>13 efficient than dry sieve. Okay? The dry sieve use</p> <p>14 vibration device to shake the sieves so that the</p> <p>15 particle was falling through the holes, but the wet</p> <p>16 sieve is much more efficient to see the kind of fine</p> <p>17 powder samples.</p> <p>18 So they wet the sample, put a water</p> <p>19 solution, and sieve it. Then this portion was</p> <p>20 retained by the 400 mesh sieve. They collect that</p> <p>21 from a service, then try to take SEM picture.</p> <p>22 Q. So, this other image, which will be</p> <p>23 Exhibit 43. The file name on this is "Wet-Sieved</p> <p>24 Talc SG 210_6500_SE_ETD."</p> <p>25 A. Let me explain the file name.</p>

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<p style="text-align: right;">66</p> <p>1 Q. No. Well, sure, go ahead. Tell us 2 what the file name. 3 A. 6500 magnification. Okay. 4 Q. All right. 5 A. "SE" is secondary electron image. 6 Okay? 7 Q. So, we can apply that structure to 8 all of the file names in that folder? 9 A. That's right. 10 Q. Okay. Great. Thank you. That 11 actually helps a lot. 12 So what we're looking at here is 13 SG210 with what, little bits of talc stuck in it? 14 A. I think so. 15 Q. Is this part of what -- I'm sorry. 16 Is this part of what you used to determine the part 17 of your report discussing the role of fiber lengths 18 and particle lengths? 19 A. Correct. 20 Q. Have you prepared any kind of a 21 report or summation discussing your opinions 22 relative to the data you produced as a result of the 23 Pittsburgh meeting in June of this year? 24 A. You mean prepare what report? 25 Q. That's what I'm asking you. Have you</p>	<p style="text-align: right;">68</p> <p>1 morning, Dr. Su. How are you today? 2 A. I'm fine. Thank you. 3 Q. Thanks for taking the time here. 4 In preparing your report related to 5 Dr. Longo, were you able to use the photos he 6 supplied and make -- and provide opinions concerning 7 those photos? 8 A. Yes. 9 Q. Okay. And were you able to take the 10 data that he supplied and provide opinions related 11 to that data? 12 A. Correct. 13 Q. And despite whatever shortcomings you 14 indicated earlier on, you were able to take the 15 opinions and the data supplied and provide opinions 16 in this case, correct? 17 A. Correct. 18 Q. All right. And your opinions differ 19 from Dr. Longo, correct? 20 A. Correct. 21 Q. Okay. And you were able to provide 22 your opinions despite any issues you had with the 23 lighting, correct? 24 A. Yes. I mention the lighting is a 25 factor affecting the dispersion staining color.</p>
<p style="text-align: right;">67</p> <p>1 prepared a report or a summation of your opinions 2 relative to the data you produced in June specific 3 to the Pittsburgh project? 4 A. Nobody ask me. Okay. 5 Q. So you have not? 6 A. No. 7 MR. BRALY: Chris, are you good to go 8 here? 9 MR. PLACITELLA: You're ready for me? 10 MR. BRALY: I believe so. 11 MR. PLACITELLA: Okay. Well, why 12 don't we take a five-minute break then, and I'll get 13 my stuff together. 14 MR. BRALY: Okay. The one document 15 that you asked me to print, I'm going to go ahead, 16 and that will be the next exhibit in line, which is 17 Exhibit 44. Okay. 18 MR. PLACITELLA: Okay. 19 MR. BRALY: All right. I will pass 20 the witness at this time and let Mr. Placitella ask 21 some questions. 22 (Recess: 11:10 a.m. to 11:11 a.m., 23 Eastern Standard Time.) 24 CROSS-EXAMINATION MR. PLACITELLA: ^ 25 Q. I wish I could be there with you this</p>	<p style="text-align: right;">69</p> <p>1 Q. Okay. But you were still -- despite 2 your issues with the lighting, you were still able 3 to provide an opinion based upon the method and data 4 that Dr. Longo used, correct? 5 A. Correct. All my image or data is 6 from MAS reports. 7 Q. Okay. And despite the testimony you 8 gave about brightness concerning the photo, the data 9 that was generated by Dr. Longo's lab enabled you to 10 provide an independent opinion in this case, 11 correct? 12 A. Correct. 13 Q. Okay. Now, in this case, the first 14 day I counted you mentioned "Becke Line" about 79 15 times. And after you went to Middlesex County and 16 witnessed Dr. Longo's testimony, is that when you 17 went to Pittsburgh? 18 A. Yeah, I went Pittsburgh after that. 19 Q. Okay. And you did -- and you said 20 that one of the definitive tests to perform was the 21 Becke Line analysis, correct? 22 A. Can you say again? 23 Q. One of the definitive tests that you 24 use was the Becke Line test, correct? 25 A. Correct.</p>

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<p style="text-align: right;">70</p> <p>1 Q. How long did it take you to do 2 that -- 3 A. It's very quick. You just -- 4 Q. -- when you were in Pittsburgh? 5 A. Yes. Okay. It's very quick. You 6 just switch to a non-central stop dispersion mode. 7 Q. Okay. When you were with Dr. Sanchez 8 in Pittsburgh, how long were you there? 9 A. We were there for two and a half 10 days. 11 Q. Okay. And the actual -- two and a 12 half days, and the actual testing that you did, how 13 long did that take? 14 A. Oh, I should correct. We were 15 there -- we arrived the day before. I mean, we 16 worked for two and a half days. 17 Q. So you were there three and a half 18 days together? 19 A. Yeah. I arrived there the day 20 before, I leave the third day. That's why it's half 21 day. I leave in the afternoon. 22 Q. And in front of the microscope, how 23 much time did you spend when you were in Pittsburgh? 24 A. I think the first day probably nine 25 or ten hour. The second day is pretty similar to</p>	<p style="text-align: right;">72</p> <p>1 for that work, those three days? 2 A. Just the hours I've been working. 3 Q. Right. Do you have any idea what you 4 billed them for? 5 A. Like, I don't remember exact number, 6 but it was calculate by the travel time plus the 7 actual time working in the lab. 8 Q. And did you record everything you 9 did? 10 A. Yes. 11 Q. And after you did that, you never 12 supplemented your MDL report, correct? 13 A. No. 14 Q. Now, whose idea was it to videotape 15 what you were doing? 16 A. My idea. 17 Q. Okay. And am I correct that none of 18 the work that you did in Pittsburgh involved heavy 19 liquid separation? 20 A. No. 21 Q. So I'm correct. None of it did, 22 correct? 23 A. Correct. 24 Q. Okay. You also at some point 25 monitored Dr. Hess's -- Mr. Hess's deposition,</p>
<p style="text-align: right;">71</p> <p>1 that. The third day, the half day is, I think, in 2 the morning, and one hour in the afternoon. Or one 3 hour in the -- 4 Q. So -- 5 A. Half afternoon, because I left at 3 6 p.m. to the airport. 7 Q. Okay. So you spent about 15 to 20 8 hours under the microscope? 9 A. I think I spent probably 26 or 27 10 hours in doing the analysis. 11 Q. Okay. So you spent 26 or 27 hours 12 doing the analysis. And of the 26 or 27 hours, was 13 it -- how much time of that 26 or 27 hours did you 14 use to do the Becke Line analysis? 15 A. I did not count the time. Every time 16 I look at dispersion staining color, I turn the 17 objective lens to switch that to Becke Line mode. 18 That is the -- 19 Q. What's your best estimate of the 20 amount of time you spent in the Becke Line mode of 21 the 27 hours? 22 A. Probably equal to the amount time 23 observing the central stop dispersion staining 24 color. 25 Q. Okay. And how much did you charge</p>	<p style="text-align: right;">73</p> <p>1 correct? 2 A. Correct. 3 Q. All right. Did you help counsel 4 prepare for that deposition? 5 A. No. 6 Q. Did you read the transcript after the 7 deposition? 8 A. I read part of them so far; not the 9 whole transcripts. 10 Q. What was your role -- or what did you 11 understand your role to be to when monitoring the 12 deposition? 13 MR. HYNES: Vague. 14 A. I want to know how he analyzes 15 samples. How he did, because he is the -- he is the 16 one who perform the analysis. I want to know the 17 detail of his analytical procedure and technique. 18 Q. Okay. But you were able to prepare 19 your 100-page MDL report without knowing that, 20 correct? 21 A. Correct. 22 Q. Did Mr. Hess testify to anything that 23 you disagreed with? 24 A. Yes. 25 Q. And what was that?</p>

19 (Pages 70 to 73)

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<p style="text-align: right;">74</p> <p>1 A. If I can recall from the report I</p> <p>2 read, the first issue is he said for negative</p> <p>3 elongation mineral, the gamma is less than alpha,</p> <p>4 which is totally incorrect.</p> <p>5 Also, the second issue so far after I</p> <p>6 read the transcript is, he said he did not calibrate</p> <p>7 the dispersion staining color by himself; somebody</p> <p>8 else did that. That is also wrong. Because if you</p> <p>9 are the analyst, you will have to calibrate your</p> <p>10 eyes to the dispersion staining color displayed in</p> <p>11 the equipment you used to perform analysis.</p> <p>12 So far, those are two issues I found</p> <p>13 which is wrong.</p> <p>14 Q. Anything else?</p> <p>15 A. Not yet. I have not read the whole</p> <p>16 transcript yet.</p> <p>17 Q. But you were there. What do you</p> <p>18 recall that you disagreed with? What else?</p> <p>19 A. So far I cannot recall from my head.</p> <p>20 I would trust the transcript; therefore, I have to</p> <p>21 wrest through the whole transcript to see is any</p> <p>22 other issue I disagree.</p> <p>23 Q. So as you sit here today, the only</p> <p>24 two things you can recall are what you just</p> <p>25 testified about, correct?</p>	<p style="text-align: right;">76</p> <p>1 Q. Okay. Can you use X-ray diffraction</p> <p>2 to find chrysotile in talc?</p> <p>3 A. No, I don't think there are procedure</p> <p>4 technique to find chrysotile asbestos, I emphasize,</p> <p>5 not the general chrysotile, but --</p> <p>6 Q. Right.</p> <p>7 A. -- I know we meant chrysotile</p> <p>8 asbestos.</p> <p>9 No, there's no technique which can</p> <p>10 analyze chrysotile asbestos by powder X-ray</p> <p>11 diffraction. It's not any X-ray diffraction; it's</p> <p>12 called powder X-ray diffraction.</p> <p>13 Q. Right.</p> <p>14 Can you use powder X-ray diffraction</p> <p>15 as a screening technique to determine if talc has</p> <p>16 asbestos in it?</p> <p>17 MR. HYNES: Vague.</p> <p>18 A. No, because the powder X-ray</p> <p>19 diffraction could not determine the aspect ratio.</p> <p>20 Q. Okay.</p> <p>21 A. So it cannot determine any</p> <p>22 asbestiform minerals.</p> <p>23 Q. So, in your expert opinion, X-ray</p> <p>24 diffraction cannot be used to detect any asbestiform</p> <p>25 minerals; true?</p>
<p style="text-align: right;">75</p> <p>1 MR. HYNES: Asked and answered.</p> <p>2 A. Could you say again? Could you</p> <p>3 repeat the question?</p> <p>4 Q. Yes.</p> <p>5 As you sit here today, the only two</p> <p>6 issues you're able to recall are those that you just</p> <p>7 spoke to me about, correct?</p> <p>8 A. Correct.</p> <p>9 MR. HYNES: Same objection.</p> <p>10 Q. Okay. You are -- do you recall that</p> <p>11 there was some disagreement about -- well, strike</p> <p>12 that. I won't go there.</p> <p>13 Are you familiar with a testing</p> <p>14 method called X-ray diffraction?</p> <p>15 A. Yes. But I have not reviewed any</p> <p>16 X-ray diffraction report from MAS.</p> <p>17 Q. That's not my question. My question</p> <p>18 is: Are you familiar with X-ray diffraction?</p> <p>19 A. Yes, I do.</p> <p>20 Q. All right.</p> <p>21 (Technical difficulty.)</p> <p>22 BY MR. PLACITELLA:</p> <p>23 Q. Have you ever used X-ray diffraction</p> <p>24 for any type of asbestos analysis?</p> <p>25 A. Not asbestos.</p>	<p style="text-align: right;">77</p> <p>1 A. No.</p> <p>2 Q. And does that include amphiboles as</p> <p>3 well?</p> <p>4 A. As well.</p> <p>5 Q. Okay. And that's based upon your 40</p> <p>6 years of experience?</p> <p>7 A. No, it's not based on my experience;</p> <p>8 it's based on the principle of the technique.</p> <p>9 Q. Okay.</p> <p>10 A. The technique can only determine the</p> <p>11 mineral phase by the crystal structure, but it</p> <p>12 cannot determine the "morpholog." As you know, the</p> <p>13 "morpholog" is one of the important criteria to</p> <p>14 define asbestos mineral.</p> <p>15 Q. Okay. So, should X-ray diffraction</p> <p>16 ever be used as a screening technique as a first</p> <p>17 step in determining whether a product contains</p> <p>18 asbestos, in your opinion?</p> <p>19 MR. HYNES: Vague; overbroad.</p> <p>20 A. I have not research on this project.</p> <p>21 Q. Well, in your opinion and experience,</p> <p>22 is X-ray diffraction a valid method as a first step</p> <p>23 for screening for asbestos in material?</p> <p>24 MR. HYNES: Vague; overbroad; asked</p> <p>25 and answered.</p>

20 (Pages 74 to 77)



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<p style="text-align: right;">78</p> <p>1 A. Not asbestos, but as a screening tool 2 for mineral identification. There's a difference 3 between the mineral identification and asbestos 4 identification. 5 Q. Okay. 6 A. When you say "asbestos," it has to be 7 conform in the "morpholog." Since X-ray diffraction 8 could not determine the "morpholog," so it's 9 accurately speaking it's not screening tool for 10 asbestos. 11 Q. Okay. Is it a valid screening tool 12 for finding serpentine minerals? 13 A. That's right. It's a screening tool, 14 I repeat, for mineral identification, not involving 15 "morpholog." 16 Q. And do you have any idea of what 17 the -- how long -- well, strike that. 18 I'm going to talk a little bit now 19 about -- just a couple of questions about PLM. 20 If you're using -- have you ever used 21 PLM to determine whether there was asbestiform and 22 amphiboles in a product? 23 A. No. 24 Q. Why not? 25 A. Because so far I was asked to review</p>	<p style="text-align: right;">80</p> <p>1 document that I gave you? 2 MR. BRALY: Yes. 3 MR. PLACITELLA: Could you mark that 4 and give it to the witness? 5 MR. BRALY: Yeah, it's Exhibit 44. 6 MR. PLACITELLA: Okay. I want to see 7 if I can share my screen at the same time. 8 Can you see my screen. 9 MR. BRALY: Very small. 10 MR. PLACITELLA: I'll make it bigger. 11 THE WITNESS: Yeah, I can look at the 12 hard copy. Which page do you want to -- 13 MR. HYNES: Seven. 14 BY MR. PLACITELLA: 15 Q. Can you see my screen now, or page 7? 16 A. Okay. Yeah, I'm at page 7. 17 Q. Just take a second and look at that. 18 For the record, I'm showing him Part 19 2 of the CTFA J4-1 asbestiform mineral analysis 20 protocol. Let me know when you're done looking at 21 it, Doctor. 22 You with me? 23 A. Yes, I finished reading. 24 Q. Okay. Sorry. 25 Okay. So, under -- see under the</p>
<p style="text-align: right;">79</p> <p>1 the PLM analysis of chrysotile. 2 Q. Okay. Do you need to do a Becke line 3 analysis to confirm whether something is an 4 asbestiform amphibole? 5 MR. HYNES: Vague; overbroad. 6 A. Could you repeat question, please? 7 Q. Sure. 8 You talked about the need with 9 Mr. Bradley to perform a Becke Line analysis to 10 determine whether what you're saying is chrysotile, 11 correct? 12 A. Correct. 13 Q. All right. Do you have to do the 14 same thing when you're trying to determine whether 15 an amphibole is asbestiform? Do you still need a 16 Becke Line analysis? 17 A. I'm sure I would need that; however, 18 so far I have not been asked to do that. 19 Q. Well, I understand you haven't been 20 asked to do it. I'm asking you based on your 21 expertise as a PLM microscopist, whether in order to 22 determine a product, an amphibole product is 23 asbestiform, you must do a Becke Line analysis? 24 A. Yes. 25 MR. PLACITELLA: Ben, do you have the</p>	<p style="text-align: right;">81</p> <p>1 section where it says "optical microscopy and 2 dispersion staining"? 3 A. Yes. 4 Q. All right. Would you -- in your 5 opinion, is that procedure as outlined in this 6 specification sufficient to identify an 7 asbestos-containing amphibole without anything else? 8 A. I don't think this correct procedure, 9 or a complete procedure. 10 Q. And why is that? 11 A. Because nobody identify asbestos by 12 central stop dispersion staining color; you identify 13 any asbestos component by refractive index. So here 14 it says only about the dispersion staining color in 15 the oil, 1.605. It did not mention how you get the 16 dispersion staining color. Because the dispersion 17 staining color is affected by the intensity of 18 illumination, by the distorted dispersion staining 19 color, also by the calibration of the system, 20 affected also by the color temperature of the light 21 source. 22 So, the color is affected by so many 23 factors, so nobody ever defined in any literature or 24 any test method to define a asbestos component by 25 color.</p>

21 (Pages 78 to 81)

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<p style="text-align: right;">82</p> <p>1 Q. So --</p> <p>2 A. However, the only parameter which can</p> <p>3 identify is the refract index. The refract index is</p> <p>4 absolute, is intrinsic property of the asbestos</p> <p>5 mineral. Whether you measure it in California,</p> <p>6 measure that in New Jersey, the refract index is the</p> <p>7 same. However, the color would depend which</p> <p>8 polarized light microscope you use, what kind</p> <p>9 intensity of illumination you use, or whether what</p> <p>10 is the color temperature, what the light source,</p> <p>11 whether it's a constant or AED, whether you use a</p> <p>12 daylight filter. They all affect the color</p> <p>13 displayed by the particle.</p> <p>14 So therefore, you can really not,</p> <p>15 just by saying you can identify simply by color.</p> <p>16 Q. Okay. So, up at the top it gives you</p> <p>17 the list of the apparatus that's part of this spec,</p> <p>18 right? It says, "Bertrand lens, high-intensity</p> <p>19 light source."</p> <p>20 You see that?</p> <p>21 A. Yes, I saw that.</p> <p>22 Q. So using that apparatus and this as a</p> <p>23 specification, could you ever determine definitively</p> <p>24 whether a mineral that you're seeing is asbestiform</p> <p>25 or not?</p>	<p style="text-align: right;">84</p> <p>1 there any way to guarantee consistent results just</p> <p>2 following this specification?</p> <p>3 MR. HYNES: Calls for speculation.</p> <p>4 A. As I said, not by following this</p> <p>5 specification. This specification did not tell you</p> <p>6 the color temperature, did not tell you the light</p> <p>7 source, did not tell you intensity, many factors</p> <p>8 which affect the dispersion staining color. And</p> <p>9 also, it did not tell you, you will have to</p> <p>10 calibrate the dispersion staining color, again, the</p> <p>11 specific instrument, the specific setting, and also</p> <p>12 the specific eyes' perception to the color.</p> <p>13 Q. So --</p> <p>14 A. There are so many factors, are</p> <p>15 missing in this specification. So this</p> <p>16 specification could not produce the correct refract</p> <p>17 index. I have to emphasize, only refract index can</p> <p>18 identify whether it is asbestos or not. But this</p> <p>19 procedure completely missed that procedure, that</p> <p>20 step.</p> <p>21 Q. Could this specification ever</p> <p>22 identify chrysotile using a PLM, in your opinion?</p> <p>23 A. If you know how to correctly perform</p> <p>24 the dispersion staining technique, if you know how</p> <p>25 to correctly perform the "methododge" and also you</p>
<p style="text-align: right;">83</p> <p>1 MR. HYNES: Vague; overbroad.</p> <p>2 A. Anyway, let me emphasize the only way</p> <p>3 you can determine the asbestos, whether it's</p> <p>4 chrysotile or amphibole, is to measure its refract</p> <p>5 index on the polarized light microscopy. This</p> <p>6 procedure does not tell you how to do that. Also,</p> <p>7 it did not mention the color temperature of your</p> <p>8 system. It mention the source, high-intensity light</p> <p>9 source. You can use a different level of intensity.</p> <p>10 Now, you can use the different color</p> <p>11 temperature. You can use the daylight filter or</p> <p>12 not. Each variation will affect the central stop</p> <p>13 dispersion staining color displayed and observed by</p> <p>14 the operator, by the analyst.</p> <p>15 Q. So --</p> <p>16 A. Also, a very important procedure here</p> <p>17 is missing. As I said, you can only identify</p> <p>18 whether it is asbestos or not by measuring the</p> <p>19 refract index. This procedure did not tell you</p> <p>20 about that. Even you observe the dispersion</p> <p>21 staining color, how do you get the refract index,</p> <p>22 which is the most important part of the procedure?</p> <p>23 However, this procedure did not tell you.</p> <p>24 Q. All right. So if you gave this</p> <p>25 specification to ten different microscopists, is</p>	<p style="text-align: right;">85</p> <p>1 know how to convert the color into the refract</p> <p>2 index, now you can. If you cannot produce the</p> <p>3 correct assessment of the central stop dispersion</p> <p>4 staining color, then you couldn't.</p> <p>5 Q. Okay. So how would you guarantee --</p> <p>6 so if you had to rewrite the specification, what</p> <p>7 would you include?</p> <p>8 A. Well, if I am commissioned to do</p> <p>9 that, I will write a very detail step-by-step</p> <p>10 procedure for analysis. Okay? Then everybody can</p> <p>11 follow.</p> <p>12 Q. Why do you need a detailed</p> <p>13 step-by-step analysis?</p> <p>14 A. Because, as I said, there are so many</p> <p>15 factors affecting the central stop dispersion color</p> <p>16 displayed and observed by the analyst. And also, a</p> <p>17 most important step of procedure is, if you can</p> <p>18 correctly get the dispersion staining color, then</p> <p>19 you will have to convert that color into the</p> <p>20 numerical value of the mineral, then you can</p> <p>21 identify. Without that step, nobody can.</p> <p>22 So this procedure is so incomplete</p> <p>23 and so vague, but I'm sure I can develop a complete</p> <p>24 procedure to accomplish this task by correctly</p> <p>25 measure the refract index of any mineral, opaque</p>

22 (Pages 82 to 85)

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<p style="text-align: right;">86</p> <p>1 mineral by polarized light microscopy.</p> <p>2 Q. So I do apologize because I</p> <p>3 interrupted you. You said you would give a</p> <p>4 step-by-step detailed procedure. Can you just lay</p> <p>5 that out for us? How would you rewrite the</p> <p>6 specification if you really wanted to find out</p> <p>7 whether a product had asbestos in it or not?</p> <p>8 A. Yeah, if I'm commissioned to do that.</p> <p>9 Q. Well, you're getting paid by the hour</p> <p>10 now, so do your best.</p> <p>11 A. Nobody ask me. Okay?</p> <p>12 Q. I'm asking.</p> <p>13 A. Well, okay. I will consider,</p> <p>14 however, and I can bill you for the time?</p> <p>15 Q. We're being billed in the deposition,</p> <p>16 Doctor. I just want to know if you have to rewrite</p> <p>17 the specification to make sure it was capable of</p> <p>18 finding asbestos in talc, what would you -- what</p> <p>19 would you put in? Give me your outline, at least.</p> <p>20 MR. HYNES: Objection to form; asked</p> <p>21 and answered.</p> <p>22 A. I would cover every aspect of the</p> <p>23 correctly measure the central stop dispersion</p> <p>24 staining color. First, the method or procedure will</p> <p>25 cover every aspect about the central stop dispersion</p>	<p style="text-align: right;">88</p> <p>1 speculation.</p> <p>2 A. I have not been asked to; therefore,</p> <p>3 I don't have to express my opinion. However, if I</p> <p>4 am asked to, I can do that.</p> <p>5 Q. Respectfully, Doctor, I'm just asking</p> <p>6 a simple question. Would you ever recommend to</p> <p>7 Johnson &amp; Johnson to use this procedure to screen</p> <p>8 talc for asbestos? That's my question.</p> <p>9 MR. HYNES: Same objection.</p> <p>10 A. Why I should recommend to them?</p> <p>11 Q. I'm asking you as somebody with</p> <p>12 experience who's testified now for a couple of days</p> <p>13 and has 40 years of history using a polarized light</p> <p>14 microscope, would you ever recommend to</p> <p>15 Johnson &amp; Johnson that they use this procedure</p> <p>16 outlined in this specification to test for asbestos</p> <p>17 in talc? It's a simple question; yes or no?</p> <p>18 MR. HYNES: Same objection.</p> <p>19 A. It's not yes-and-no question. It is</p> <p>20 a question: Why should I do that?</p> <p>21 Q. Because I'm asking you a --</p> <p>22 A. Then if I must do that, of course I</p> <p>23 can.</p> <p>24 Q. Okay. So, I'm asking you in a</p> <p>25 deposition so we know what your opinions are on PLM</p>
<p style="text-align: right;">87</p> <p>1 technique; secondly, my cover -- my procedure will</p> <p>2 cover how do you derive the object's refract index</p> <p>3 by central stop dispersion staining technique.</p> <p>4 So there are two major part: First,</p> <p>5 there are many details about obtaining the correct</p> <p>6 central stop dispersion staining color; the second</p> <p>7 major part will be how do you go from the color to</p> <p>8 the refract index.</p> <p>9 Q. Okay.</p> <p>10 A. If I will write the procedure, I will</p> <p>11 cover every aspect.</p> <p>12 Q. So if you were giving advice to</p> <p>13 Johnson &amp; Johnson for what they should do to screen</p> <p>14 talc for asbestos, would you ever advise them to use</p> <p>15 this method that's on this document?</p> <p>16 A. It have not happened, okay, so I</p> <p>17 cannot say anything about that. But I can assure</p> <p>18 you I'm fully capable and qualified to give -- to</p> <p>19 document a very comprehensive and accurate procedure</p> <p>20 to perform the analysis.</p> <p>21 Q. But here's my question. I know you</p> <p>22 haven't been commissioned to do it. Would you ever</p> <p>23 recommend to Johnson &amp; Johnson that they use this</p> <p>24 procedure to screen for asbestos in talc?</p> <p>25 MR. HYNES: Vague; calls for</p>	<p style="text-align: right;">89</p> <p>1 whether you would ever recommend to</p> <p>2 Johnson &amp; Johnson that they use this specification</p> <p>3 to screen for asbestos in talc. It's a very simple</p> <p>4 question.</p> <p>5 MR. HYNES: Same objection.</p> <p>6 A. No, it's not a simple question. You</p> <p>7 mean what I would recommend, why I will have to</p> <p>8 recommend. That's the first question. If I have</p> <p>9 to, then you can ask me whether I would do that or</p> <p>10 not.</p> <p>11 Q. So are you refusing to answer the</p> <p>12 question, Doctor?</p> <p>13 A. I refuse to answer this question not</p> <p>14 because I am not capable of outlining a detailed</p> <p>15 procedure, it's I need to know what I should</p> <p>16 recommend or not. I need to know the reason.</p> <p>17 Q. Let me ask you the question this way.</p> <p>18 A. Okay.</p> <p>19 Q. Are you capable of providing an</p> <p>20 opinion as to whether this specification...</p> <p>21 (Technical difficulty.)</p> <p>22 A. Of course I'm capable.</p> <p>23 MR. PLACITELLA: We're not sharing a</p> <p>24 screen anymore, correct?</p> <p>25 MR. HYNES: Correct.</p>

23 (Pages 86 to 89)



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<p style="text-align: right;">90</p> <p>1 BY MR. PLACITELLA:</p> <p>2 Q. Are you capable of providing an</p> <p>3 opinion as to whether Johnson &amp; Johnson should ever</p> <p>4 use this specification to screen for asbestos in</p> <p>5 talc? Are you capable of giving that opinion?</p> <p>6 A. I am capable.</p> <p>7 Q. Okay. And what is that opinion?</p> <p>8 A. Is that about whether I'm capable of</p> <p>9 producing a procedure to determine the refract index</p> <p>10 of mineral including asbestos? I want a</p> <p>11 clarification on that.</p> <p>12 Q. Okay. Let me ask the question a</p> <p>13 different way.</p> <p>14 A. Okay.</p> <p>15 Q. If you were a scientist working at</p> <p>16 Johnson &amp; Johnson and assigning somebody the task of</p> <p>17 determining whether there's asbestos in talc, would</p> <p>18 you ever hand them this specification with no other</p> <p>19 instructions and say, "Follow this specification"?</p> <p>20 MR. HYNES: Objection to form; calls</p> <p>21 for speculation.</p> <p>22 A. I still don't understand your</p> <p>23 question because my job here is to assess the</p> <p>24 analytical report by MAS. They found asbestos in</p> <p>25 the chrysotile to be exactly in the baby powder</p>	<p style="text-align: right;">92</p> <p>1 did not tell the analyst how do you determine the</p> <p>2 refract index. So, therefore, this specification is</p> <p>3 very incomplete.</p> <p>4 Q. Would you agree with me that this</p> <p>5 specification indicates it's for amphiboles only?</p> <p>6 A. Not for any mineral.</p> <p>7 Q. It says for amphiboles; does it not?</p> <p>8 A. No.</p> <p>9 Q. It doesn't? Are we looking at the</p> <p>10 same thing?</p> <p>11 A. It doesn't.</p> <p>12 Q. What's the title say on Phase 2 at</p> <p>13 the top of the page?</p> <p>14 A. Well, the title is "Specification" --</p> <p>15 let me see. Also on the top of the cover,</p> <p>16 CTFA, Cosmetic" --</p> <p>17 Q. I'm just talking about the top of the</p> <p>18 page we're looking at.</p> <p>19 A. Yes, "CTFA Specification."</p> <p>20 Q. Right. Okay. And does it say</p> <p>21 "asbestiform amphibole minerals"? Top of page 7.</p> <p>22 A. Talc.</p> <p>23 Page 7, yeah, amphibole.</p> <p>24 Q. Amphibole.</p> <p>25 Would you agree with me as written</p>
<p style="text-align: right;">91</p> <p>1 product. My job is to assess whether their report</p> <p>2 is correct or not.</p> <p>3 Q. Well, let me ask you the question</p> <p>4 this way: You indicated earlier when I was</p> <p>5 questioning you that Dr. Longo's lab was able to</p> <p>6 generate data and photographs that you could rely</p> <p>7 upon in forming your own opinions, correct?</p> <p>8 A. Correct.</p> <p>9 Q. If Dr. Longo's lab followed this</p> <p>10 specification, would they be capable of generating</p> <p>11 reports and data that you could rely upon?</p> <p>12 MR. HYNES: Incomplete hypothetical;</p> <p>13 calls for speculation.</p> <p>14 A. Which specification? Could you</p> <p>15 please clarify?</p> <p>16 Q. The specification in front of you for</p> <p>17 PLM for Amphiboles - Part 2.</p> <p>18 MR. HYNES: Same objections.</p> <p>19 A. If they perform the technique</p> <p>20 correctly, that is the prerequisite. If they are</p> <p>21 incapable performing the technique correctly, they</p> <p>22 can't; however, if they truly understand the optical</p> <p>23 crystallography, polarized light microscopy and</p> <p>24 optical "mineralog," of course they can. However,</p> <p>25 as I repeat, this procedure is so complete [sic], it</p>	<p style="text-align: right;">93</p> <p>1 this was never intended to find chrysotile in talc,</p> <p>2 if it existed?</p> <p>3 A. No. As I said, this specification is</p> <p>4 so complete, and also, it lacks so many details.</p> <p>5 Q. When you say "complete," you mean</p> <p>6 incomplete, correct?</p> <p>7 A. Incomplete, yeah.</p> <p>8 Q. Incomplete.</p> <p>9 A. Not complete.</p> <p>10 Q. Not complete.</p> <p>11 A. Yeah. Incomplete.</p> <p>12 Q. So we're on the same page, and I'll</p> <p>13 stop.</p> <p>14 As written, this specification is so</p> <p>15 incomplete that there's no way it could be used on</p> <p>16 its face to determine whether there's asbestos in</p> <p>17 talc; true?</p> <p>18 A. No.</p> <p>19 Q. Would you agree with the following</p> <p>20 statement: "It's imperative that both dispersion</p> <p>21 staining color and fibrous morphology criteria be</p> <p>22 satisfied, as well as the Becke Line determination</p> <p>23 of refractive index, before identifying a particle</p> <p>24 as asbestiform amphibole"?</p> <p>25 A. Not according to this specification.</p>

24 (Pages 90 to 93)

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\*\*\*ROUGH DRAFT\*\*\*

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<p style="text-align: right;">94</p> <p>1 Q. And so this specification fails in 2 that regard, correct? 3 A. That's right. 4 Q. Okay. Let me just look here. We 5 might have to take five minutes so I can talk to 6 Ben. He'll tell me what else I forgot. So why 7 don't we just take five minutes. Okay? 8 A. Okay. 9 (Recess: 11:59 a.m. to 12:06 p.m., 10 Eastern Standard Time.) 11 MR. PLACITELLA: So, I don't have any 12 other questions at this time, and I'm hopeful you 13 can get out of New Brunswick and beat the traffic 14 before it gets bad. So, unless somebody else is 15 going to ask any other questions, I'm done. 16 MR. HYNES: Are there any other 17 questions from people on the line? Hearing none, I 18 will have a couple questions, Dr. Su. Thanks again 19 for sitting for this deposition over the last two 20 days. Appreciate it. 21 THE WITNESS: Thanks. 22 REDIRECT EXAMINATION BY MR. HYNES: ^ 23 Q. The first thing I wanted to ask you 24 was today you mentioned this concept of 25 birefringence. You described it as the absolute</p>	<p style="text-align: right;">96</p> <p>1 then I won't interrupt anymore. 2 MR. HYNES: Standing objection. 3 BY MR. HYNES: 4 Q. Dr. Su, you also described in, I 5 think, day one of your deposition that you would 6 refer to R-93 for refractive index values in 7 chrysotile. Is that right? 8 A. R-93, EPA method? 9 Q. Yeah. Table 22, I think. 10 A. Yeah, that is the table describing 11 the refract index of the asbestos minerals. 12 Q. Okay. And then do you also cite 13 ISO 22262-1 in your report? 14 A. Yes. 15 Q. Okay. And does ISO 22262-1 include 16 known ranges for NIST standard chrysotile refractive 17 index values? 18 A. Say again, what question is? 19 Q. Does ISO 22262-1 also include known 20 ranges for refractive index values for NIST standard 21 chrysotile? 22 A. Actually, I don't know because I 23 never reads that section, if there is a section of 24 that. 25 Q. Okay.</p>
<p style="text-align: right;">95</p> <p>1 difference between the alpha and gamma refractive 2 index values. Is that right? 3 A. Correct. 4 Q. So if we looked at some of the 5 sources that you cited in your report, such as R-93, 6 Bloss, ISO 22262-1, we would see that birefringence 7 is defined as this absolute difference between alpha 8 and gamma, correct? 9 A. Correct. 10 Q. Okay. And this idea that you may see 11 a range of refractive index values in chrysotile 12 from the same source, that's something that you 13 don't agree with. Is that right? 14 A. No. 15 Q. You will see one true refractive 16 index in alpha and one true refractive index in 17 gamma. Is that right? 18 A. Correct. 19 Q. Okay. 20 MR. PLACITELLA: Let me just put my 21 objection on the record. I'm not going to keep 22 doing it, but these are leading questions of an 23 expert witness in a deposition, and I'm going to 24 object to any of those questions. And if you give 25 me a standing objection to your leading questions,</p>	<p style="text-align: right;">97</p> <p>1 A. Because I know what refract index 86 2 is. Okay? 3 Q. Okay. So if it's reported in there, 4 it's reported in there. That's fine. 5 Then you were asked a series of 6 questions about this concept of Becke Line analysis. 7 There are methods for determining refractive index 8 values of a mineral using Becke Line analysis 9 independent of any central stop dispersion staining 10 analysis. Is that right? 11 A. Correct. 12 Q. Okay. The central stop dispersion 13 staining analysis uses Becke Line as a complementary 14 way to determine what part of a particle that you're 15 looking at under central stop dispersion staining 16 color, you should use to assign the correct 17 refractive index value. Is that right? 18 A. Correct. 19 Q. Okay. And so, this concept of Becke 20 Line analysis, it's not that it's a independent 21 method, it's part of how a trained analyst who knows 22 how to perform central stop dispersion staining will 23 perform their central stop dispersion staining 24 analysis. Is that right? 25 A. No.</p>

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<p style="text-align: right;">98</p> <p>1 Q. Tell me more, then.</p> <p>2 A. Yeah, the Becke Line is not a</p> <p>3 dependent method; it is the independent method.</p> <p>4 Matter of fact, you can determine the opaque</p> <p>5 minerals refract index simply by Becke Line, but you</p> <p>6 cannot do this for central stop dispersion staining</p> <p>7 color technique without Becke Line method to</p> <p>8 differentiate the distorted dispersion staining</p> <p>9 color from the normal correct dispersion staining</p> <p>10 color.</p> <p>11 Q. Okay. So, is it true that a trained</p> <p>12 analyst who understands the principle of central</p> <p>13 stop dispersion staining will, in order to determine</p> <p>14 what are true dispersion staining colors versus</p> <p>15 distorted staining colors, they will refer to the</p> <p>16 Becke Line to make that call?</p> <p>17 A. Yes. Yes.</p> <p>18 Q. Okay.</p> <p>19 A. A very important part of the</p> <p>20 procedure is to recognize which part of the</p> <p>21 dispersion staining color is the normal dispersion</p> <p>22 staining color and which part of the dispersion</p> <p>23 staining color displayed is distorted dispersion</p> <p>24 staining color. Now, to differentiate between these</p> <p>25 two, you have to use the Becke Line. So far that's</p>	<p style="text-align: right;">100</p> <p>1 plaintiff marked Exhibit 41, a series of count</p> <p>2 sheets for TEM analysis of chrysotile SG210.</p> <p>3 Do you recall reviewing that for the</p> <p>4 first time during today's deposition?</p> <p>5 A. Yes.</p> <p>6 Q. Okay. The count sheets and</p> <p>7 photomicrographs that you were provided, do they</p> <p>8 provide any information for you about the sample</p> <p>9 preparation process for the materials being analyzed</p> <p>10 here?</p> <p>11 A. Sample preparation?</p> <p>12 Q. Correct.</p> <p>13 A. Standard TEM grid preparation.</p> <p>14 Q. But do you know what was done,</p> <p>15 whether or not there was liquid density separation</p> <p>16 technique used, sonication performed, wet-sieving,</p> <p>17 anything of that nature before these materials were</p> <p>18 analyzed by TEM? Is that information included in</p> <p>19 what you were shown today?</p> <p>20 A. No.</p> <p>21 Q. And sample preparation procedures may</p> <p>22 impact the size distribution of particles that are</p> <p>23 being analyzed subsequently by TEM, right?</p> <p>24 A. Correct.</p> <p>25 MR. BRALY: Object. He's offered as</p>
<p style="text-align: right;">99</p> <p>1 my experience.</p> <p>2 Q. Okay. You were asked some</p> <p>3 hypotheticals about bundle thickness and its impact</p> <p>4 on refractive index values. In central stop</p> <p>5 dispersion staining analysis, is it true that bundle</p> <p>6 thickness will not change the refractive index of a</p> <p>7 mineral being analyzed?</p> <p>8 A. No, because the refract index is an</p> <p>9 intrinsic physical property of any crystal, any</p> <p>10 minerals. It was determined by the elemental</p> <p>11 composition, the chemical composition, and the</p> <p>12 crystal structure, the way how those atoms connect</p> <p>13 to each other.</p> <p>14 Now, these two property were not</p> <p>15 change with size or thickness of a material, a</p> <p>16 mineral. So, even the size of the change, the</p> <p>17 refract index is not. Again, I have to, if refer to</p> <p>18 asbestos to chrysotile, and we have evidence, as I</p> <p>19 said, the standard reference material 1866 series,</p> <p>20 whether 1866, 1866a or 1866b, they are measured as</p> <p>21 single fibrils. You cannot go any thinner than</p> <p>22 that. Therefore, the refract index value, the gamma</p> <p>23 1.556, alpha 1.549 is for the chrysotile. It did</p> <p>24 not change with the fiber size or bundle size.</p> <p>25 Q. Shifting gears: Counsel for</p>	<p style="text-align: right;">101</p> <p>1 an expert in PLM. But go ahead. That's fine.</p> <p>2 BY MR. HYNES:</p> <p>3 Q. You answered that's right, right?</p> <p>4 A. Yes.</p> <p>5 Q. And you were asked some questions</p> <p>6 about a NVLAP inspection in 2016.</p> <p>7 Do you recall that questioning?</p> <p>8 A. Yes, I did.</p> <p>9 Q. That's when you were an assessor and</p> <p>10 you went to MAS's laboratory to review the</p> <p>11 conditions at the time in, I believe it was</p> <p>12 September of 2016, correct?</p> <p>13 A. Correct.</p> <p>14 Q. That predates any of the</p> <p>15 Johnson &amp; Johnson reports that you've reviewed in</p> <p>16 this case, correct?</p> <p>17 A. No. No, I was not aware of -- again,</p> <p>18 they have not give me any of those material for me</p> <p>19 to review. And the assessment, as matter of fact,</p> <p>20 only concern two technique: One is the bulk</p> <p>21 asbestos analysis by EPA, the second is the airborne</p> <p>22 asbestos analysis by EPA. So that's only two</p> <p>23 technique I need to assess, not actual sample they</p> <p>24 apply that. But normally, we want focus on AHERA.</p> <p>25 I will ask them AHERA analysis, but not any other</p>



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<p style="text-align: right;">102</p> <p>1 client request.</p> <p>2 Q. So the types of analyses that you</p> <p>3 reviewed that Dr. Longo produced in which he</p> <p>4 identified chrysotile by PLM in Johnson &amp; Johnson</p> <p>5 Baby Powder containers, those sorts of procedures</p> <p>6 were not something you evaluated during that visit</p> <p>7 in 2016?</p> <p>8 A. No, not at all.</p> <p>9 Q. And then correct me if I'm wrong, but</p> <p>10 would a laboratory that receives a NVLAP audit</p> <p>11 receive the audit reports that are prepared by the</p> <p>12 assessor, and then the reviewer who assesses the</p> <p>13 report of the assessor that actually made the site</p> <p>14 visit would they get those materials?</p> <p>15 A. Oh, yes, they do. Actually, before</p> <p>16 the assessor leave the lab after the completing the</p> <p>17 assessment, you will have to review the whole report</p> <p>18 and get their signature. You have to give them a</p> <p>19 complete copy, which have the three form, the</p> <p>20 general criteria form, the polarized -- the bulk</p> <p>21 asbestos form, the PLM form, and the third is the</p> <p>22 TEM form.</p> <p>23 Q. And have you been a reviewer of an</p> <p>24 assessor's report at MAS since this 2016 timeframe?</p> <p>25 A. Yes, I did.</p>	<p style="text-align: right;">104</p> <p>1 don't -- I did not agree, because that is so basic,</p> <p>2 such a major mistake. Alpha is smaller than gamma.</p> <p>3 How could you, in your bench sheet, you said the</p> <p>4 alpha is greater than gamma? Of course this mistake</p> <p>5 affect every report you issued before Dr. Bo Li's</p> <p>6 assessment. Okay?</p> <p>7 So the lab respond and says we were</p> <p>8 correct that; however, we don't think it would</p> <p>9 affect the past results. Therefore, in my comments</p> <p>10 I said there's such a fundamental mistake, sure it</p> <p>11 will affect, because all your past reports, they</p> <p>12 were wrong. I remember I made that comment in my</p> <p>13 review.</p> <p>14 Q. And that was -- those comments and</p> <p>15 that review, that all happened before you had ever</p> <p>16 seen any of Dr. Longo's analyses of chrysotile in</p> <p>17 cosmetic talcs?</p> <p>18 A. No, it was in 2021, I wasn't aware.</p> <p>19 I know nothing about the talc sample.</p> <p>20 Q. Okay. And do you know whether or not</p> <p>21 Dr. Longo's laboratory is currently a NVLAP</p> <p>22 accredited laboratory for PLM work?</p> <p>23 A. Not right now, but they used to.</p> <p>24 They used to, I think.</p> <p>25 Q. All right. You were asked a number</p>
<p style="text-align: right;">103</p> <p>1 Q. Did you have criticisms of MAS after</p> <p>2 this 2016 NVLAP report was issued?</p> <p>3 A. Yes. And I recognized there's a page</p> <p>4 of the -- my assessment in 2016, and there is a page</p> <p>5 of Dr. Bo Li's assessment in 2021, let me see, 2021</p> <p>6 or 2022. Yeah, I saw a sheet that remember me, yes,</p> <p>7 I reviewed Dr. Bo Li's assessment report. That is</p> <p>8 part of the NVLAP procedure. I did not ask to</p> <p>9 review -- assign the review work to me.</p> <p>10 Q. And you got criticisms of MAS's PLM</p> <p>11 procedures in that 2021 --</p> <p>12 A. Correct. Because one of the</p> <p>13 nonconformity reported documented in Dr. Bo Li's</p> <p>14 report is they confuse the alpha and gamma for</p> <p>15 chrysotile in their count sheets. And when MAS</p> <p>16 respond to this report to this nonconformity, they</p> <p>17 said it did not affect the past analysis because</p> <p>18 NVLAP procedure required where you identify a</p> <p>19 nonconformity, one of the thing the lab will have to</p> <p>20 review what kind impact are your past work, if you</p> <p>21 made some mistake, now, what kind of impact on the</p> <p>22 past work, until this time the mistake was</p> <p>23 identified by the assessor.</p> <p>24 So I remember the response from MAS</p> <p>25 was it did not affect the past analysis, which I</p>	<p style="text-align: right;">105</p> <p>1 of questions about the CTFA J4-1 methodology.</p> <p>2 Do you recall those questions by</p> <p>3 Mr. Placitella?</p> <p>4 A. Yes.</p> <p>5 Q. Were you familiar with the</p> <p>6 specification before you saw it during the course of</p> <p>7 today's questioning, or is this the first time that</p> <p>8 you've seen it?</p> <p>9 A. That's the first time I saw that.</p> <p>10 Q. Okay. So you don't know when this</p> <p>11 was promulgated?</p> <p>12 A. What?</p> <p>13 Q. Do you know what year this was</p> <p>14 promulgated?</p> <p>15 A. No. Must be a number of years ago.</p> <p>16 I think I had some vague impression reading some</p> <p>17 paper, they said there was a method, but I never</p> <p>18 seen that method document myself.</p> <p>19 Q. Okay. And you don't know any of the</p> <p>20 context in which this method was developed. Is that</p> <p>21 right?</p> <p>22 A. No, not at all.</p> <p>23 Q. Okay. And one of the things that you</p> <p>24 mentioned here was that the method itself doesn't</p> <p>25 provide, you know, the level of specificity that you</p>

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<p style="text-align: right;">106</p> <p>1 would require for soup to nuts polarized light</p> <p>2 microscopy analysis of asbestiform minerals in talc.</p> <p>3 Is that right?</p> <p>4 A. That's right.</p> <p>5 Q. Okay. You would go to other</p> <p>6 potential references for further information about</p> <p>7 how to perform the specific central stop dispersion</p> <p>8 staining analysis beyond what's presented on this</p> <p>9 page 7 of what you were shown. Is that right?</p> <p>10 A. That's right.</p> <p>11 MR. PLACITELLA: Objection; leading.</p> <p>12 Objection; leading.</p> <p>13 MR. HYNES: Go ahead.</p> <p>14 A. However, the major -- major flaw of</p> <p>15 this specification is, they did not have the key</p> <p>16 procedure to determine the numerical refract index</p> <p>17 of the amphibole. Without that data, there's no way</p> <p>18 you can identify whether the target object is</p> <p>19 amphibole or not.</p> <p>20 Q. Say, in 1976 or 1977, what references</p> <p>21 would you go to for that information that you just</p> <p>22 described?</p> <p>23 A. I don't know. Maybe McCrone. Okay?</p> <p>24 Q. Okay.</p> <p>25 A. Dr. McCrone had developed the graphic</p>	<p style="text-align: right;">108</p> <p>1 That's not fair. You knew they were coming. If you</p> <p>2 had that document he was bringing, he should have</p> <p>3 disclosed them. I mean, this deposition by ambush</p> <p>4 that you've been conducting now for two days needs</p> <p>5 to stop.</p> <p>6 MR. HYNES: I apologize,</p> <p>7 Mr. Placitella, however --</p> <p>8 MR. PLACITELLA: There's no apology.</p> <p>9 This was deliberate. This was deliberate. He had</p> <p>10 the documents. You could have turned them over and</p> <p>11 you didn't.</p> <p>12 MR. HYNES: Well --</p> <p>13 MR. PLACITELLA: And I will bring it</p> <p>14 to the Court's attention.</p> <p>15 MR. HYNES: Why don't we walk through</p> <p>16 it with him and you can decide whether or not you</p> <p>17 want to continue to object.</p> <p>18 BY MR. HYNES:</p> <p>19 Q. Go ahead, Dr. Su. What did you</p> <p>20 bring?</p> <p>21 A. Okay. The first one is my -- my</p> <p>22 paper in 2022, "The Dispersion Staining Technique</p> <p>23 and Its Application to Measuring Refractive Indices</p> <p>24 of Non-Opaque Materials With Emphasis on Asbestos</p> <p>25 Analysis," which was published in the journal, "The</p>
<p style="text-align: right;">107</p> <p>1 solution from dispersion staining color to the</p> <p>2 numerical refractive index. I believe at that time</p> <p>3 Dr. McCrone had that procedure. You can use his</p> <p>4 graphic solution to get the numerical value of the</p> <p>5 asbestos mineral or any mineral from its central</p> <p>6 stop dispersion staining color.</p> <p>7 Q. And one of the things that's noted on</p> <p>8 the following page is that dispersion staining</p> <p>9 device that's commercially available would be from</p> <p>10 Walter McCrone. Is that right?</p> <p>11 A. That means the dispersion staining</p> <p>12 objective.</p> <p>13 Q. Right.</p> <p>14 Okay. And then you brought a couple</p> <p>15 of documents with you to today's deposition. I</p> <p>16 don't know what they are, so, do you want to just</p> <p>17 tell us what they are and maybe we'll mark them as</p> <p>18 exhibits.</p> <p>19 A. Okay.</p> <p>20 MR. PLACITELLA: Are these documents</p> <p>21 that have been disclosed before?</p> <p>22 MR. HYNES: He brought them with him</p> <p>23 to today's deposition, so I do not know.</p> <p>24 MR. PLACITELLA: Well, that's not</p> <p>25 fair and I object to any questions about them.</p>	<p style="text-align: right;">109</p> <p>1 Microscope." That's the first thing I brought.</p> <p>2 Q. That was Exhibit 13 to day one?</p> <p>3 A. Yeah. That was on the first day</p> <p>4 deposition.</p> <p>5 The second thing I brought was the</p> <p>6 transcript --</p> <p>7 Q. Exhibit 32.</p> <p>8 A. Exhibit 32 of the last deposition.</p> <p>9 The third document I brought, yeah,</p> <p>10 was two table, which one is the chrysotile in</p> <p>11 Cargille oil, 1.550; the second is the chrysotile in</p> <p>12 Cargille 1.560, which were used to -- by MAS.</p> <p>13 MR. BRALY: Do you mind if I just</p> <p>14 take a look at them?</p> <p>15 A. (Handing.)</p> <p>16 Q. So those are your --</p> <p>17 A. Yeah --</p> <p>18 Q. -- tables?</p> <p>19 A. That's my table plus the ISO</p> <p>20 dispersion staining color chart provide by -- from</p> <p>21 ISO document.</p> <p>22 MR. HYNES: Okay. So, and</p> <p>23 that's -- just for the record, so I guess what we</p> <p>24 have is, it looks like -- so the first page in this</p> <p>25 manila folder is chrysotile in Cargille 1.550 E, and</p>

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<p style="text-align: right;">110</p> <p>1 so it looks like Dr. Su took the alpha and gamma 21 2 degrees Celsius from his 2022 publication along with 3 the wavelength column of that table, and then in the 4 middle of those he put the ISO color bar. 5 Q. So everything is together on one 6 page. For ease, you're matching up. Is that right? 7 A. Yes. 8 Q. Okay. And then the next page of this 9 is the same thing, with the 1.560 from that. I 10 guess it's the excerpts of the table from the same 11 publication. Is that right? 12 A. Correct. 13 Q. Okay. And then the next is just the 14 full table for 1.550; and then the next is the full 15 table for 1.560, right? 16 A. Yeah. 17 Q. Okay. And then did you bring 18 anything else with you? 19 A. Yeah. The third document I brought 20 is my MDL report on May 21st of 2024. 21 Q. Okay. 22 A. I think that's all. 23 Q. Right. I guess -- so, why did you 24 bring these charts, Dr. Su? 25 A. Yeah, because I was evaluate the</p>	<p style="text-align: right;">112</p> <p>1 A. Yeah. Just from Exhibit 32. 2 Q. Okay. I guess for the record we 3 should mark 45, we'll mark those four tables you 4 made; and then 46, we'll mark the one-page sheet. 5 And then it looks like you put Post-Its on Exhibit 6 32, so we'll mark that all as one. 7 MR. PLACITELLA: Just for 8 clarification, the tables were created between last 9 deposition and this deposition? 10 MR. BRALY: No, Chris. It's just a 11 central stop dispersion staining table. 12 MR. PLACITELLA: I can't see it. 13 That's why I'm asking. 14 MR. HYNES: Yeah, these are just -- 15 yeah, basically, he took his table from that 16 publication he carried in with him. 17 MR. PLACITELLA: Okay. Got it. 18 MR. HYNES: And he put an ISO color 19 bar. 20 THE WITNESS: Can you show this on 21 the screen? 22 MR. BRALY: No, we're fine. 23 BY MR. HYNES: It will be marked as an 24 exhibit, and we'll mark this handwritten set of 25 stuff as 46.</p>
<p style="text-align: right;">111</p> <p>1 Exhibit 32, because I was asked in last session 2 about the bentonite report by MAS. At that time I 3 answered they are Calidria chrysotile. Now I 4 realize after I exam the Exhibit 32 provide by the 5 plaintiff, I realize my answer was wrong. They were 6 not Calidria chrysotile. 7 Q. Okay. 8 A. And based on the refract index value, 9 document MAS micrograph, the photo. Because the 10 value indicate the alpha and the gamma value is 11 totally different from the Calidria chrysotile. And 12 the birefringence, the number one sample is .03, or 13 13. The rest is 6. The range value is .017 to 14 .019, which is completely -- which is out of the 15 range of any chrysotile, let alone the Calidria. 16 The Calidria birefringence is .005. 17 Every sample in this exhibits is way 18 above that. They range from 1.013 to .019, whereas 19 the Calidria chrysotile is .005; therefore, none of 20 this minerals, they are Calidria chrysotile. 21 Q. Looks like there's one more thing 22 that you, I guess, brought with you. It's this one 23 page -- 24 A. Okay. Yeah, I summarized that. 25 Q. I guess we have a one-page sheet.</p>	<p style="text-align: right;">113</p> <p>1 THE WITNESS: Okay. 2 MR. HYNES: And that's it. 3 Questioning? 4 MR. BRALY: Yeah, briefly. 5 RECROSS-EXAMINATION BY MR. BRALY: 6 Q. Dr. Su, you're almost through here. 7 Congratulations. You survived your first 8 deposition. 9 Using the Becke Line analysis to 10 complement dispersion staining is something that you 11 have never published until 2023, correct? 12 A. Yes. 13 Q. That is correct? 14 A. That's correct. 15 Q. Great. 16 Nowhere in your report, which is 17 Exhibit 3 to this transcript -- nowhere in your 18 report did you criticize how Dr. Longo calculated 19 his birefringence, correct? 20 A. I think I did. 21 Q. No, you didn't, actually. And if you 22 want to -- we can go to Exhibit 3, probably present 23 this to you pretty easily. 24 A. Which page? 25 Q. Well, give me a second. We're going</p>



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<p style="text-align: right;">114</p> <p>1 to do this on the screen here.</p> <p>2 Here we go. If you take a look at</p> <p>3 the screen in front of you.</p> <p>4 A. Yes.</p> <p>5 Q. So this is your report, Exhibit 3.</p> <p>6 It's 99 pages long, right?</p> <p>7 A. Yes.</p> <p>8 Q. If you do a word search for the word</p> <p>9 "birefringence," it appears three times in this</p> <p>10 entire document.</p> <p>11 Sir, if you'll pay attention to the</p> <p>12 screen, please.</p> <p>13 A. Okay.</p> <p>14 Q. It appears three times. The first</p> <p>15 time it appears twice in one paragraph on page 3,</p> <p>16 the word "birefringence."</p> <p>17 Sir, can you please pay attention to</p> <p>18 the screen?</p> <p>19 A. Yes. I will find it on hard copy.</p> <p>20 Q. I'm telling you. It's page 3 of your</p> <p>21 report.</p> <p>22 A. It's easier for me to read from this</p> <p>23 color copy.</p> <p>24 Q. Okay.</p> <p>25 A. Page 3. Yes.</p>	<p style="text-align: right;">116</p> <p>1 THE WITNESS: Can I answer now?</p> <p>2 MR. HYNES: Yeah.</p> <p>3 BY MR. BRALY:</p> <p>4 Q. I mean, it's a yes-or-no answer.</p> <p>5 A. My answer is: The birefringence is a</p> <p>6 secondary product -- property. It was determined by</p> <p>7 the primary property after refractive index.</p> <p>8 Q. I agree. And that's what you said in</p> <p>9 Paragraph 3.</p> <p>10 A. That's right.</p> <p>11 Q. Yes. What I'm asking is, you never</p> <p>12 criticized the method by which it was calculated in</p> <p>13 Dr. Longo's -- you never discussed that in your</p> <p>14 report, correct?</p> <p>15 A. I don't have to --</p> <p>16 Q. Just answer my question. You don't</p> <p>17 discuss that in the report, correct?</p> <p>18 A. No.</p> <p>19 Q. Thank you.</p> <p>20 Your 2021 NVLAP review, the review</p> <p>21 that was done by Bo Li that you had comments about.</p> <p>22 A. Yeah.</p> <p>23 Q. Do you have documents pertaining to</p> <p>24 this NVLAP review?</p> <p>25 A. You see, the review was done on the</p>
<p style="text-align: right;">115</p> <p>1 Q. And what you're saying is that if you</p> <p>2 have the wrong RI value, that you will get a subdued</p> <p>3 birefringence value, correct?</p> <p>4 A. Correct.</p> <p>5 Q. Meaning that the relationship between</p> <p>6 RI is a relationship to the resulting birefringence</p> <p>7 calculation?</p> <p>8 A. Correct.</p> <p>9 Q. Okay. So you mentioned the word</p> <p>10 "birefringence" two times in this one paragraph in</p> <p>11 Exhibit 3?</p> <p>12 A. Yes, I did.</p> <p>13 Q. Now, you if you'd pay attention to</p> <p>14 the screen.</p> <p>15 A. Okay.</p> <p>16 Q. The only other time "birefringence"</p> <p>17 appears in your report is in your bibliography, in</p> <p>18 an article from 1989.</p> <p>19 Do you see that?</p> <p>20 A. Yes, I do.</p> <p>21 Q. The word doesn't appear in your</p> <p>22 report in any other location. So it is a true</p> <p>23 statement that you never articulate a criticism of</p> <p>24 the method by which birefringence was calculated by</p> <p>25 Dr. Longo, correct?</p>	<p style="text-align: right;">117</p> <p>1 portal of the NVLAP. So first they assign me to</p> <p>2 review --</p> <p>3 Q. Sir, I am just asking you: Do you</p> <p>4 have documents relative to the 2021 --</p> <p>5 A. That's what I'm answering.</p> <p>6 Q. Okay.</p> <p>7 A. It is document in the portal of the</p> <p>8 NVLAP.</p> <p>9 Q. Do you have access to that portal?</p> <p>10 A. Of course I have access as assessor.</p> <p>11 Q. I mean, is that something that you</p> <p>12 can download from the portal and --</p> <p>13 A. No, we are not allowed to download</p> <p>14 it; we can only write input in the portal. And</p> <p>15 also, like once I finish my review, then the MAS,</p> <p>16 the target lab will be able to see my comments in</p> <p>17 the portal.</p> <p>18 Q. Okay.</p> <p>19 A. We are not allowed to print or</p> <p>20 download that.</p> <p>21 Q. So, your comments, if I understood it</p> <p>22 correctly, was that Bo Li recognized an error had</p> <p>23 been made relative to the assignment of alpha and</p> <p>24 gamma values?</p> <p>25 A. Correct.</p>

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<p style="text-align: right;">118</p> <p>1 Q. And that Bo Li, who was the analyst 2 who had done that review, said essentially that this 3 was a isolated mistake and shouldn't affect prior 4 studies, or something to that effect, and you 5 disagreed with that? 6 MR. HYNES: Misstates testimony. 7 A. No, no, no. It's not Dr. Bo Li. It 8 is MAS -- 9 Q. No, I understand that. I'm sorry. 10 Let me re-ask the question, then. 11 A. Okay. 12 Q. Was it Bo Li -- that's a woman, 13 correct? 14 A. No. 15 Q. Bo Li's not a woman? 16 A. A man. 17 Q. I'm sorry. So Bo Li did a review, 18 and is it correct that he concluded that this was an 19 isolated error that should not affect prior reviews, 20 and you disagreed with that? 21 MR. HYNES: Misstates testimony. 22 A. I don't think you express that 23 correctly. 24 Q. Okay. Please do. 25 A. Let me say.</p>	<p style="text-align: right;">120</p> <p>1 Did Dr. Bo Li find -- I mean, was 2 this ruled to be an isolated incident? 3 A. Dr. Bo Li -- 4 Q. Just answer my question: Was this an 5 isolated incident? Was that the determination of 6 NVLAP? 7 A. No, it is nonconformity; it's not 8 isolate incident. 9 Q. It was a nonconformity from one 10 evaluation? 11 MR. HYNES: Can we go off the record 12 for one second? 13 MR. BRALY: Yes, it'll be fine. 14 (Discussion held off the record.) 15 BY MR. BRALY: 16 Q. Dr. Su, I just want to understand 17 this issue a little bit better because I don't have 18 the access to the documents that you do, okay? So 19 you're saying that there was a comment made about a 20 nonconformity -- 21 A. Excuse me. Could you repeat the 22 question, please? 23 Q. Yeah. 24 I just want to understand, so, there 25 was a review of the lab, right?</p>
<p style="text-align: right;">119</p> <p>1 Q. I appreciate it. 2 A. First, Dr. Bo Li did the assessment 3 by remote, because during pandemic he could not 4 physically present at the lab; however, he identify 5 we don't use isolate or not, we only use its 6 nonconformity or not. So nonconformity means in 7 this requirement what the lab did not comply with 8 the requirement by NVLAP; therefore, it was identify 9 as nonconformity. 10 Q. Okay. 11 A. So after his assessment, the lab, all 12 they need to do is to look at are there 13 nonconformity or not; if there are, they are 14 required to respond to NVLAP. Okay. Whether 15 there's nonconformity is how they are going to 16 correct that, the corrective action, also the cause 17 of the root cause analysis, why I made this mistake. 18 The third thing they need evaluate, 19 whether this has impact to the past analysis. If it 20 is, the lab is supposed to inform the customer of 21 previous analysis about the impact, the mistake they 22 made. Yeah, that is the NVLAP procedure and the 23 policy. 24 Q. Okay. So if you're going to answer 25 my question, I would appreciate it.</p>	<p style="text-align: right;">121</p> <p>1 A. To be exact -- 2 Q. No, no, no. I'll re-ask it. 3 A. No. 4 Q. I don't want a long answer. Let me 5 try to understand this: There was a nonconformity 6 found with the lab, right? 7 A. By the assessor. 8 Q. Okay. And then there was a report 9 issued, correct? 10 A. What do you mean, "report issue"? 11 Q. What happened after the nonconformity 12 was found? 13 A. The lab has 30 days to respond to 14 NVLAP. 15 Q. Did they respond? 16 A. They did. 17 Q. Okay. And did you, in turn, issue 18 your own comments in response to MAS's initial 19 response? 20 A. Yes I did. 21 Q. Okay. 22 A. I was assigned by NVLAP to review 23 their response. 24 Q. Okay. And it's your review of the 25 response where you are saying in your opinion that</p>

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<p style="text-align: right;">122</p> <p>1 calls into question everything that they've done by 2 PLM up to that point, correct? 3 A. Only for that specific nonconformity. 4 Q. Okay. And that specific 5 nonconformity was -- how would you characterize that 6 nonconformity again? 7 A. They switch the alpha and the gamma 8 in their bench sheet. Of course that affect the 9 report. 10 Q. Sure. 11 And they switched alpha and gamma in 12 a report in the bench sheet, correct? 13 A. I am not Dr. Bo Li. If it's only in 14 one bench sheet, you are not supposed to identify 15 that nonconformity. It is a nonconformitying 16 (phonetic) in any of their bench sheets. 17 Q. Doctor, here's the problem I have: 18 You've reviewed probably close to a dozen PLM 19 reports by MAS where gamma is in excess of alpha in 20 their values. They clearly did not switch them. 21 A. Which report? 22 Q. Any of the dozen or so 23 Johnson &amp; Johnson PLM reports that you've reviewed. 24 A. After that. 25 Q. Well, a lot of those were dated</p>	<p style="text-align: right;">124</p> <p>1 if the only two mixtures in that sample are 2 bentonite clay and Calidria asbestos -- 3 A. Okay. 4 Q. -- what is the particle that's in 5 those images, if not asbestos? 6 MR. HYNES: Incomplete hypothetical; 7 assumes facts. 8 A. Well, the only conclusion about that 9 particle is by their own data. See, they document 10 that refract index of each particle, and those value 11 don't conform to Calidria chrysotile. 12 Q. I 100 percent understand what you're 13 trying to say, 100 percent get you. 14 A. Okay. 15 Q. My question to you is: If the only 16 substances in the mixture being looked at are 17 bentonite clay and asbestos, then what is it? Do 18 you have any idea what that particle is that appears 19 in those images? 20 MR. HYNES: Same objections. 21 A. If I am asked to make a determination 22 because their data showed it is not, however, if I 23 was asked to confirm whether the identification is 24 correct or not, whether it is the Calidria 25 chrysotile, I would have to analyze the sample</p>
<p style="text-align: right;">123</p> <p>1 before '21, were they not? A few of them? 2 You didn't notice in any of the 3 Johnson &amp; Johnson reports that MAS had flopped the 4 gamma value and the alpha value such that alpha 5 exceeded gamma, correct? 6 A. No, because I was asked to review the 7 assessment report in 2021; therefore, I only review 8 their response to the nonconformities identified by 9 Dr. Bo Li. It's nothing to do with their talc 10 Johnson &amp; Johnson Baby Powder analysis. 11 Q. I'm counting up more than a dozen 12 reports prior to March of 2021 that are on your 13 Exhibit B that you reviewed, PLM reports that MAS 14 did. I just want to make sure I'm clear about this. 15 You are not saying that in any of those reports that 16 MAS made a systemic mistake of flopping alpha and 17 gamma, correct? 18 A. Correct. 19 Q. Okay. That's all I needed to check. 20 A. Okay. 21 Q. As it relates to the bentonite issue, 22 if the only two mixtures in that sample were 23 bentonite and Calidria talc -- that's terrible. 24 Look at me making mistakes. I'm making mistakes. 25 Going back to the bentonite sample,</p>	<p style="text-align: right;">125</p> <p>1 myself. 2 Q. So, you don't know what it is? 3 A. Before I examine that. 4 I only know that from their report. 5 From their report, it's not. 6 Q. Right. 7 Wouldn't it -- I mean, so, let's talk 8 about the scientific method for a moment. All 9 right? 10 A. Okay. 11 Q. If you're coming to -- if you're 12 wanting to figure out the refractive index of a 13 previously uncategorized mineral. Okay? 14 A. Okay. 15 Q. And you have a known sample of that 16 mineral, and you conducted an analysis to figure out 17 what the refractive index of that mineral would be. 18 A. Yes. 19 Q. That's how you figure these things 20 out, correct? 21 A. Yes. 22 Q. Okay. So if the only two options of 23 what is in that bentonite mixture is some mineral 24 and bentonite, whatever the mineral is in that 25 mixture is what is being evaluated and reported,</p>

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<p style="text-align: right;">126</p> <p>1 correct?</p> <p>2 A. Correct.</p> <p>3 Q. Okay. You're saying it can't be</p> <p>4 chrysotile because of other data showing a lower</p> <p>5 value for refractive index, correct?</p> <p>6 A. Let me clarify. I know your</p> <p>7 question, because there are only two components:</p> <p>8 One is SB 210 chrysotile, and now there's a</p> <p>9 bentonite. If it's not bentonite, what else it</p> <p>10 could be, right?</p> <p>11 Q. That's my question.</p> <p>12 A. Yes. That's a very good question.</p> <p>13 Q. Thank you.</p> <p>14 A. It all come down to very basic</p> <p>15 question, the test method -- whether you can</p> <p>16 correctly perform the test method. If MAS is</p> <p>17 capable, correctly perform the refract index</p> <p>18 measurement, it is the first criticism in my MDL</p> <p>19 report, as said, incorrect refract index</p> <p>20 measurement.</p> <p>21 Again, this report showed they are</p> <p>22 incapable of correctly perform that procedure. If</p> <p>23 they could, then they would not make the mistake.</p> <p>24 The refract index should be correctly measured,</p> <p>25 documented.</p>	<p style="text-align: right;">128</p> <p>1 MR. BRALY: Kevin, are the tabs that</p> <p>2 are on, are you including that as part of what</p> <p>3 you're producing?</p> <p>4 MR. HYNES: We should. It looks</p> <p>5 like --</p> <p>6 THE WITNESS: I just write down the</p> <p>7 value.</p> <p>8 MR. BRALY: I know. It's fine. I</p> <p>9 want to make sure we have a record of what it is he</p> <p>10 tabbed.</p> <p>11 With that, I can pass the witness.</p> <p>12 MR. HYNES: Give me --</p> <p>13 MR. PLACITELLA: I've got a couple of</p> <p>14 minutes.</p> <p>15 MR. HYNES: Okay, Chris. Go.</p> <p>16 RECROSS-EXAMINATION BY MR. PLACITELLA: ^</p> <p>17 Q. I know I'm standing between everybody</p> <p>18 and lunch. So, I'll try to be two minutes. Can we</p> <p>19 go back to Exhibit 42, please. That's the exhibit I</p> <p>20 was asking you about before.</p> <p>21 MR. BRALY: 42 is the exhibit about</p> <p>22 wet-sieved talc.</p> <p>23 MR. PLACITELLA: Oh, what's the</p> <p>24 one --</p> <p>25 MR. BRALY: If you're looking for the</p>
<p style="text-align: right;">127</p> <p>1 Q. Okay. When did you and Mr. Hynes get</p> <p>2 together to talk about your testimony relative to</p> <p>3 the bentonite clay issue?</p> <p>4 A. No, we have not talk about that.</p> <p>5 Q. Come on, now.</p> <p>6 A. No.</p> <p>7 Q. Come on. You've been so</p> <p>8 straightforward with me for the last couple days.</p> <p>9 You guys didn't talk about your bentonite clay</p> <p>10 opinions before you came in here?</p> <p>11 A. You see, I only got this formal copy</p> <p>12 yesterday. And when I looked at, the first thing I</p> <p>13 check is all the information in this exhibits.</p> <p>14 Q. Yeah.</p> <p>15 A. I am fully capable to form my</p> <p>16 opinion. I don't have a consult with anyone. You</p> <p>17 see, this a very simple task, whether this</p> <p>18 micrograph showed it is Calidria chrysotile, because</p> <p>19 my answering last time it was, now I realized it was</p> <p>20 not.</p> <p>21 Q. Okay.</p> <p>22 A. You see, I don't -- really don't have</p> <p>23 to consult with anyone about this.</p> <p>24 Q. All right.</p> <p>25 A. Okay? Yeah.</p>	<p style="text-align: right;">129</p> <p>1 J4-1, that's 44.</p> <p>2 MR. PLACITELLA: 44. Give me 44</p> <p>3 please. Let me know when you have it in front of</p> <p>4 you.</p> <p>5 MR. HYNES: He has it in front of</p> <p>6 him.</p> <p>7 A. Yes.</p> <p>8 BY MR. PLACITELLA:</p> <p>9 Q. Remember, this was the document you</p> <p>10 went through that you said should not be used to</p> <p>11 determine whether there's asbestos in talc.</p> <p>12 Do you recall that?</p> <p>13 MR. HYNES: Objection; misstates</p> <p>14 testimony.</p> <p>15 A. Could you say the question again?</p> <p>16 Q. This is the document we spent some</p> <p>17 time on before, what you said should not be used to</p> <p>18 determine if there's asbestos in talc as a</p> <p>19 specification. You had problems with it, right?</p> <p>20 MR. HYNES: Same objection.</p> <p>21 A. That page is for amphibole. Okay?</p> <p>22 Page 7 is asbestiform amphibole mineral by optical</p> <p>23 microscopy and dispersion staining.</p> <p>24 Q. Okay.</p> <p>25 A. I think it's not applicable to</p>

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<p>130</p> <p>1 determine amphibole.</p> <p>2 Q. Okay. Mr. Hynes asked you a question</p> <p>3 about you don't know how long the specification that</p> <p>4 you're critical of was in effect.</p> <p>5 Do you recall that, him asking you</p> <p>6 that question?</p> <p>7 A. No, I don't. I don't know which year</p> <p>8 it is, so put out so --</p> <p>9 Q. Can you go to the very first page.</p> <p>10 A. Okay.</p> <p>11 Q. All right. Now go to the second</p> <p>12 page.</p> <p>13 A. Hold on. Okay.</p> <p>14 Yes.</p> <p>15 Q. See where it says "copyright 1971"</p> <p>16 all the way through 1990?</p> <p>17 A. Correct.</p> <p>18 Q. Does that give you some information</p> <p>19 about how long this specification, or some version</p> <p>20 of it, was being used?</p> <p>21 A. Correct.</p> <p>22 Q. That's all the questions I have.</p> <p>23 Thank you.</p> <p>24 MR. BRALY: I think you might be</p> <p>25 through.</p>	
<p>131</p> <p>1 Mr. Garde, do you have any questions?</p> <p>2 MR. HYNES: I don't think Mr. Garde</p> <p>3 has any questions. All right. Let's go off the</p> <p>4 record.</p> <p>5 (Deposition adjourns: 12:58 p.m.,</p> <p>6 Eastern Standard Time.)</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p>DRAFT COPY</p>

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# Exhibit 74





## CERTIFICATE OF ANALYSIS

**Chain of Custody:** 308006

Client: US Food & Drug Administration  
Address: Office of Cosmetics & Colors  
4300 River Road  
College Park, MD 20740  
Attention: John Gasper

**Job Name:** Task 3 - Analysis of Official Samples

Job Location: 4th Group - 15 Samples  
Job Number: CLIN 1 - Task 3  
PO Number: HHSF223201810337P

**Date Submitted:** 7/24/2019

Date Analyzed: 8/20/2019-9/18/2019  
Report Date: 10/3/2019  
Date Sampled: Not Provided  
Person Submitting: Goran Periz  
Revised: 10/11/2019 (Revision #2)

### SUMMARY OF ANALYSIS

AMA Sample ID	Client Sample ID	TEM LOD Using ASTM D5756 Mass Calculation	TEM LOQ Using ASTM D5756 Mass Calculation	% Tremolite by TEM Using ASTM D5756 Mass Calculation	% Chrysotile by TEM Using ASTM D5756 Mass Calculation	% Total Tremolite & Chrysotile by TEM Using ASTM D5756 Mass Calculation	% Asbestos by PLM	% Organics	% Acid Soluable	% Other	Comments
308006-6	D-58	0.0000169%	0.00000675%	ND	ND	ND	ND	0.3%	6.7%	93.1%	Gravimetric Loss from PLM Prep: Organics = 0.3%; Acid Soluable = 7.1%; Other = 92.6%
308006-6A	D-58	0.0000133%	0.00001485%	ND	< 0.00001%	< 0.00001%	ND	0.2%	19.5%	80.2%	Gravimetric Loss from PLM Prep: Organics = 0.2%; Acid Soluable = 8.5%; Other = 91.3%
308006-6B	D-58	0.0000135%	0.00000540%	ND	0.00002%	0.00002%	ND	0.2%	11.2%	88.6%	Gravimetric Loss from PLM Prep: Organics = 0.3%; Acid Soluable = 5.5%; Other = 94.2%

LOD = Limit of Detection

LOQ = Limit of Quantification

ND = Not Detected

PLM = Polarized Light Microscopy

TEM = Transmission Electron Microscopy

**Analytical Method(s):** PLM by Modified NY ELAP 198.6  
TEM by Modified NY ELAP 198.4/ASTM D5756

**Analyst(s):** PLM  
TEM

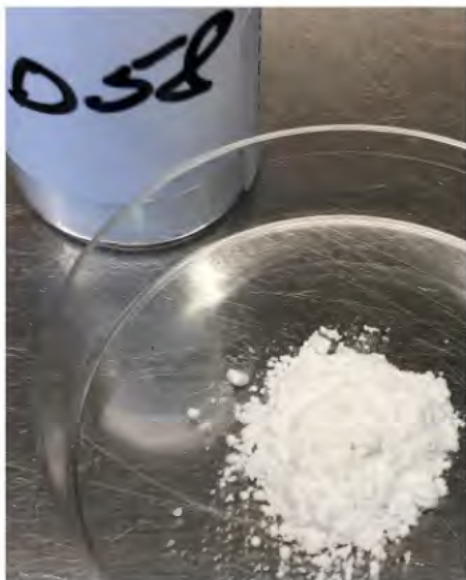
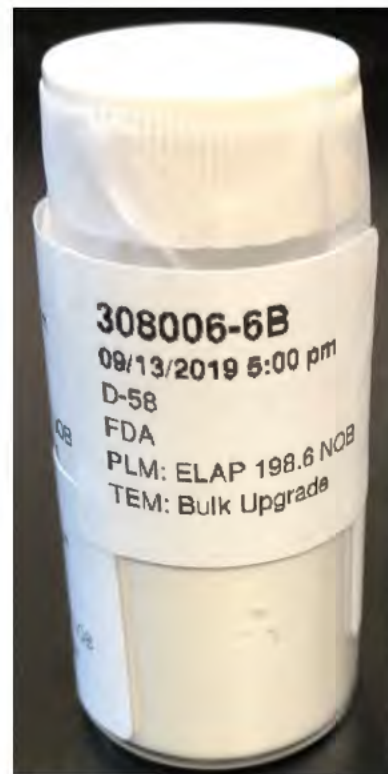
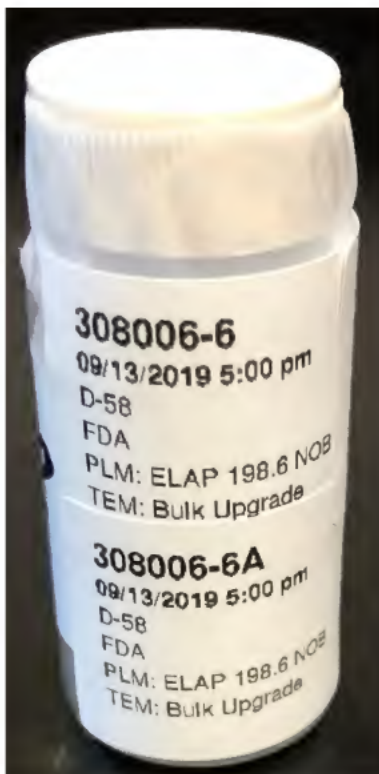
(b) (6)  
(b) (6)

Technical Director: Andreas Saldivar

All results are to be considered preliminary and subject to change unless signed by the Technical Director or Deputy

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308006-6, 6A, 6B/D58



### Sample Preparation

Samples were prepared for PLM and TEM bulk analysis by (b) (6) on August 13, 2019 through September 5, 2019. Sample preparation consisted of the following steps:

- 1) Label and weigh two 8mL glass vials for each sample in the set – one vial for the PLM preparation and one vial for the TEM preparation.
- 2) Weigh out 0.1 to 0.8 grams of material and place in corresponding 8mL glass vial. Record weight.
- 3) Burn samples at 480° C for at least 12 hours.
- 4) Record Post-Ash Weight.
- 5) Treat ashed sample with concentrated hydrochloric acid.
- 6) Filter acid reduced material onto a pre-weighed 47mm 0.4um PolyCarbonate filter.
- 7) Place filter into drying oven for 30 minutes and then record Post-Acid Reduced weight.
- 8) Make four PLM slide preparations from the PLM residual ash for each sample in 1.550 dispersion oil. Make additional preparations in 1.605, 1.625, 1.680 and 1.700 dispersion oil as necessary for particle identification.
- 9) Weigh a portion of the residue from the TEM residual ash and place it into the corresponding pre-weighed 100ml jar.
- 10) Fill the 100ml jar with deionized water
- 11) Sonicate the jars for approximate 5-minutes.
- 12) Filter 0.2ml to 1ml of the solution onto a 47mm 0.22um MCE filter.
- 13) Dry the filter for 10 minutes then collapse, carbon coat, and place on a 3 TEM grids.

### PLM Analysis

Analysis was performed in accordance with NY ELAP 198.6 protocols. The analysis was conducted using an Olympus BH-2 polarized light microscope (PLM) equipped with a dispersion staining objective. All four slide preparations for each aliquot were examined. 400-point count was performed for those samples on which asbestos was observed. If no asbestos was detected on any of the slides, the percentage of fibrous components was determined by visual estimation. The results of this analysis are detailed below in the *Discussion and Interpretation of Analytical Findings* section for each individual sample.

### TEM Analysis

Analysis was performed in accordance with modified NY ELAP Method 198.4 protocols. The analysis was performed using a JEOL JEM-100CX II transmission electron microscope (TEM), equipped with a Thermo Fisher Quest Energy Dispersive X-Ray Analyzer (EDXA), at magnifications of 19,000x. Two grids for each aliquot were examined. Twenty (20) grid openings were examined per sample.

Modifications to the NY ELAP 198.4 Method were:

- 1) The residue was not placed in alcohol and prepared using the quick drop method. To obtain a more uniform preparation, the residue was placed in a jar and filled with 100ml of deionized water. The jar was sonicated, and a portion of the solution was filtered onto a 47mm 0.22um MCE filter.
- 2) The tremolite and chrysotile were not visually estimated. The length and width of the observed particles were measured, and the mass of each amphibole particle was calculated using the ASTM D5756 method.
- 3) All particles identified as tremolite were included with the counts/concentrations, regardless of size and aspect ratio.

The results of this analysis are detailed below in the *Discussion and Interpretation of Analytical Findings* section for each individual sample.

### Calculations

ASTM D5756 Mass

$$M = \pi/4 L * W^2 * D * 10^{-12}$$

M = mass

L = length



W = width

D = density

Percent Calculation

$$\frac{\text{EFA}(\text{mm}^2) * 100\text{ml} * \text{MA}(\text{g}) * \text{RW}(\text{g})}{\text{VF}(\text{ml}) * \text{IW}(\text{g}) * \text{AA}(\text{mm}^2) * \text{RJ}(\text{g})}$$

The calculated value is then multiplied by 100 to convert it to percent.

EFA – Effective filter area

MA – Mass of asbestos

RW – Weight of residue

VF – Volume filtered

IW – Initial weight of the sample

AA – Area analyzed

RJ – Weight of residue placed into the jar

### Limit of Detection and Quantification

We used the mass of a 0.5 x 0.04-micron tremolite or chrysotile fiber, depending on what was found in each sample, as the basis for our calculations. Limit of detection was defined as 1 fiber and limit of quantification was defined as 4 fibers.

Some aliquots of sample D58 contained very small amounts of asbestos that were either at or below our 4-fiber limit of quantification. For these samples we defined our limit of quantification as follows:

308006-6A: mass of the two observed chrysotile structures plus the mass of two chrysotile fibers measuring 0.5 x 0.04 microns

308006-6B: mass of 4 chrysotile fibers measuring 0.5 x 0.04-micron

### Discussion and Interpretation of Analytical Findings:

308006-6, 6A, 6B Client Sample D-58

PLM

All three aliquots of sample D-58 were analyzed by (b) (6) on September 13, 2019. No asbestos or non-asbestos amphibole variants were detected the samples. The results were calculated using the equations detailed in the calculations section.

308006-6 NAD

308006-6A NAD

308006-6B NAD

TEM

Sample 6 was analyzed by (b) (6) on September 3, 2019. Samples 6A and 6B were analyzed by (b) (6) on September 7, 2019. The primary particle observed was talc along with a few talc fibers, talc ribbons and mica particles. Two Chrysotile structures were detected on the aliquot for 6A and four chrysotile structures were detected on the aliquot for 6B. The results were calculated using the equations detailed in the calculations section.

308006-6 NAD

308006-6A <0.00002%

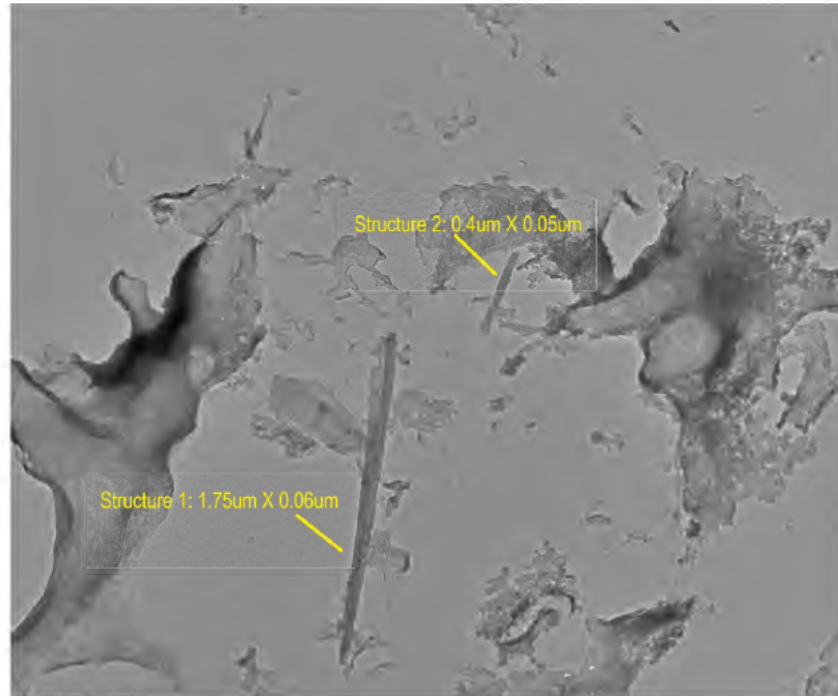
308006-6B 0.00002%

Below are pictures, diffraction patterns, and chemistry from some of the observed particles. The unidentified peaks in chemistry spectra are copper, zinc, and carbon. Those peaks are from the TEM specimen holder and specimen grid.





Sample 308006-6A, Chrysotile Structures



308006 FDA\_101.jpg  
Chrysotile Structures  
308006-6a  
Cal: 0.001774  $\mu\text{m}/\text{pix}$   
14:06 9/7/2019  
TEM Mode: Imaging  
Microscopist: CD  
Camera: NANOSPRTS, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

500 nm  
HV=100kV  
Direct Mag: 5800 x  
AMA Analytical Services, Inc

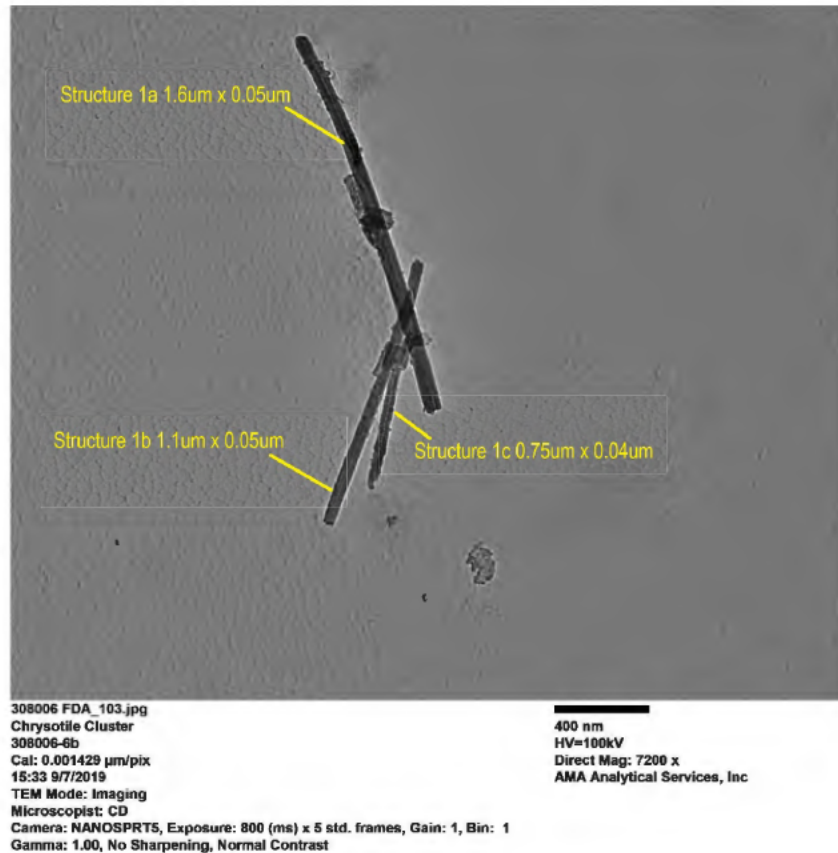
Diffraction Pattern from Chrysotile Structure 1 pictured above



308006 FDA\_100.jpg  
Chrysotile Dif  
308006-6a  
14:03 9/7/2019  
TEM Mode: Diffraction  
Microscopist: CD  
Camera: NANOSPRTS, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)  
HV=100kV  
Cam Len: 0.2200 m  
AMA Analytical Services, Inc

Sample 308006-6B, Chrysotile Structure 1



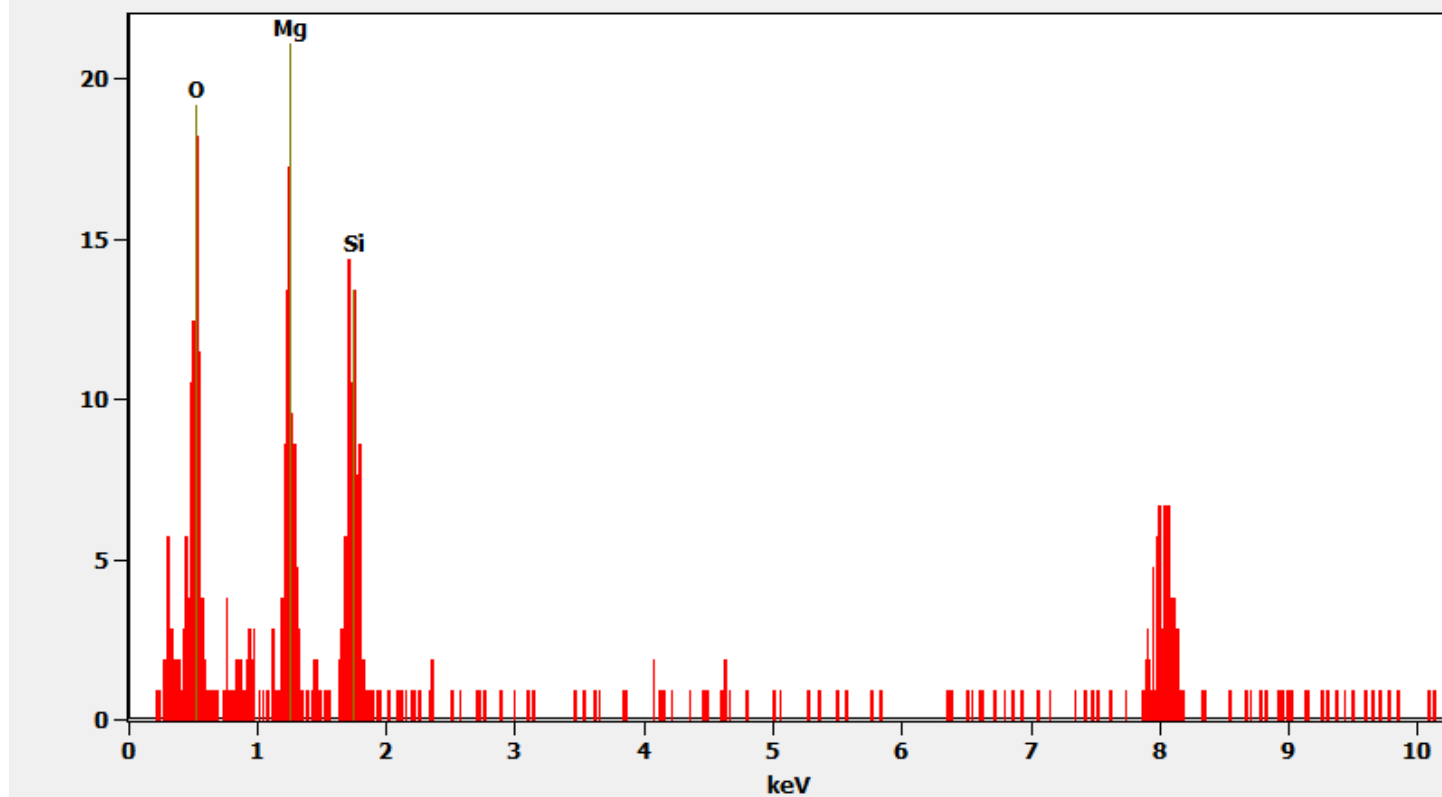
Diffraction Pattern from Chrysotile Structure pictured above



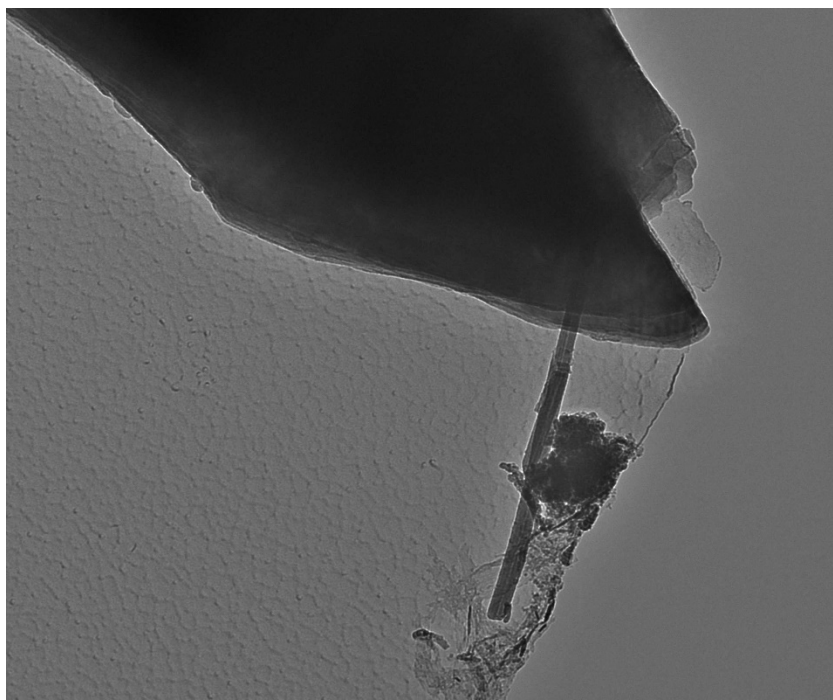
Chemistry from Chrysotile Structure pictured above

Full scale counts: 22

308006-6B(1)



308006-6B, Chrysotile Structure 2



308006 FDA\_105.jpg  
Chrysotile Fiber  
308006-6b  
Cal: 0.001029  $\mu\text{m}/\text{pix}$   
16:05 9/7/2019  
TEM Mode: Imaging  
Microscopist: CD  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

200 nm  
HV=100kV  
Direct Mag: 10000 x  
AMA Analytical Services, Inc

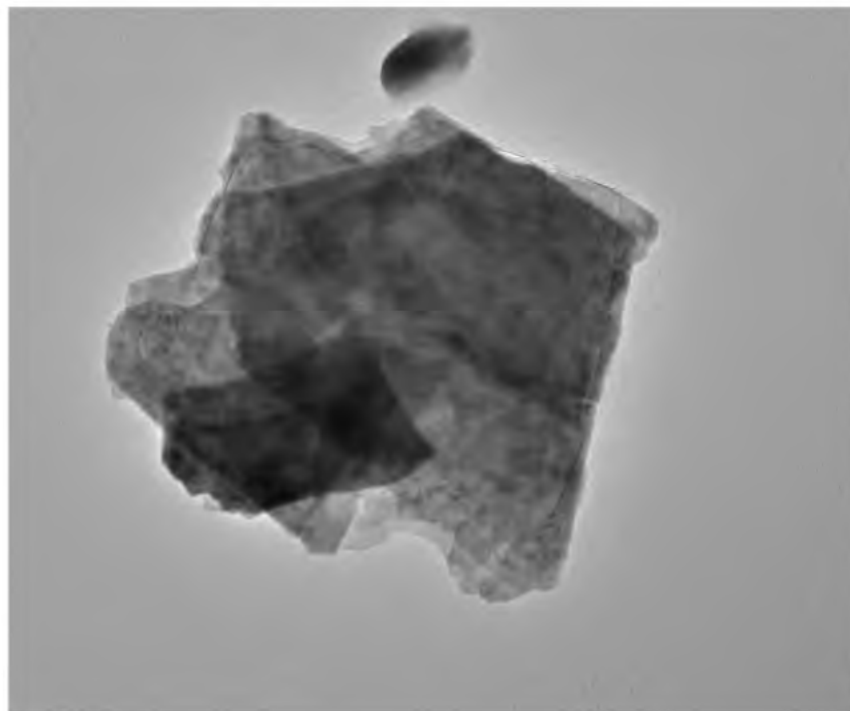
Diffraction Pattern from Chrysotile Structure pictured above



308006 FDA\_104.jpg  
Chrysotile Dif  
308006-6b  
16:03 9/7/2019  
TEM Mode: Diffraction  
Microscopist: CD  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 std. frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)  
HV=100kV  
Cam Len: 0.2200 m  
AMA Analytical Services, Inc

308006-6, Talc Particle



308006 FDA\_052.jpg  
Talc Particle  
Cal: 0.001774 µm/pix  
17:18 9/3/2019  
TEM Mode: Imaging  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

500 nm  
HV=100kV  
Direct Mag: 5800 x  
AMA Analytical Services, Inc



Hexagonal Diffraction Pattern from Talc Particle pictured above

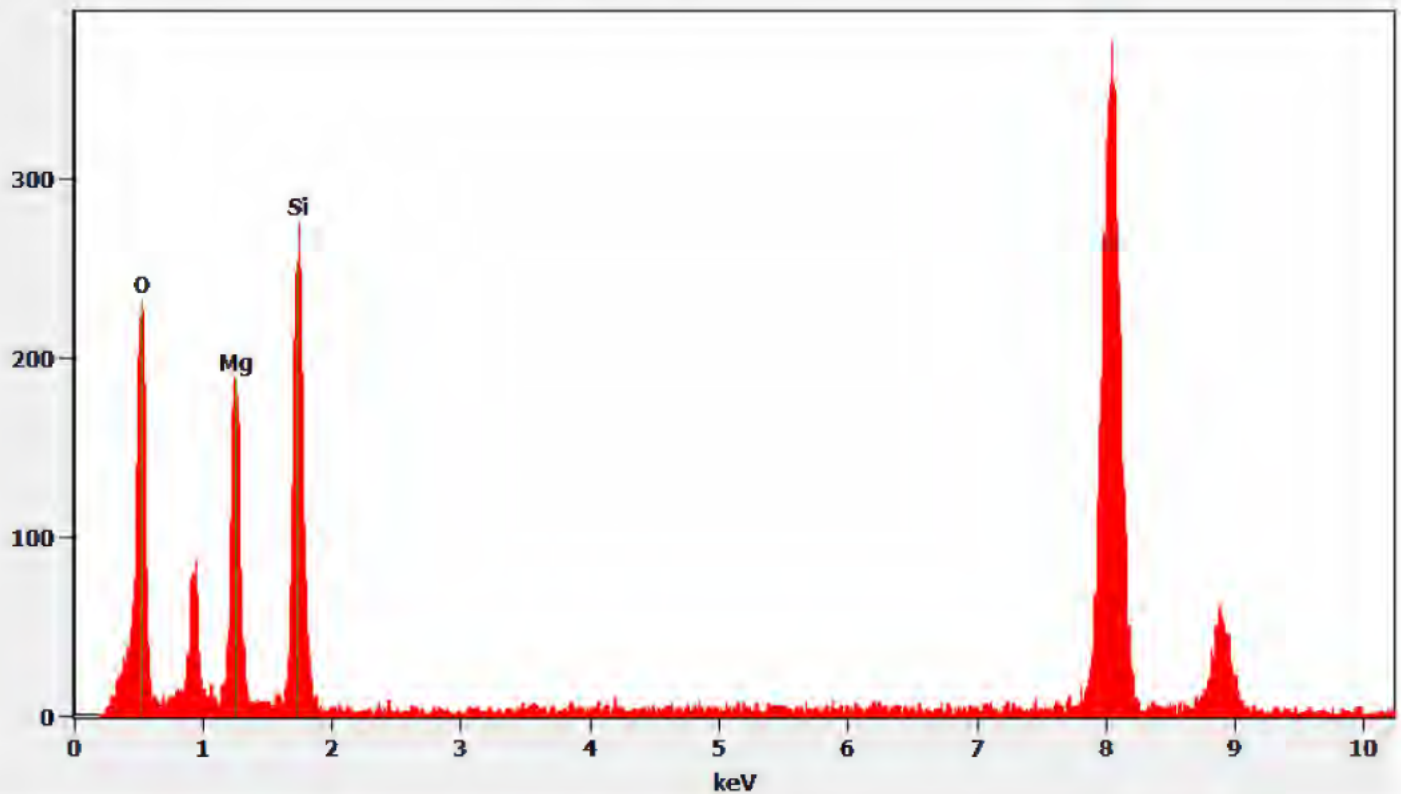


308006 FDA\_053.jpg  
Talc Particle  
17:19 9/3/2019  
TEM Mode: Diffraction  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast  
100 (1/Å)  
HV=100kV  
Cam Len: 0.2200 m  
AMA Analytical Services, Inc

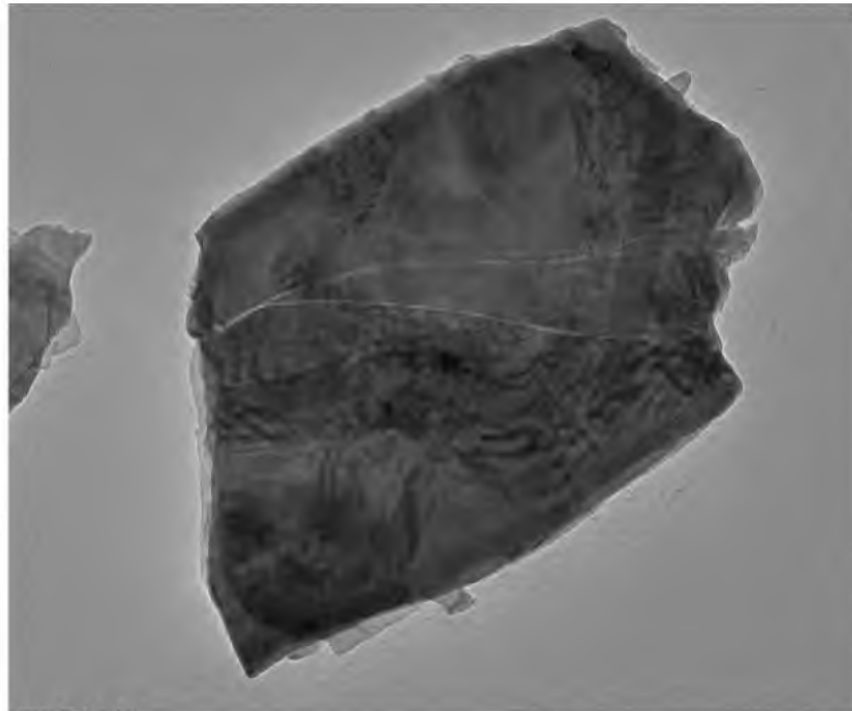
Chemistry from Talc Particle pictured above

Full scale counts: 377

308006-6(1)



306008-6, Mica Particle



308006 FDA\_054.jpg  
Mica Particle  
Cal: 0.001429  $\mu\text{m}/\text{pix}$   
17:21 9/3/2019  
TEM Mode: Imaging  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

400 nm  
HV=100kV  
Direct Mag: 7200 x  
AMA Analytical Services, Inc

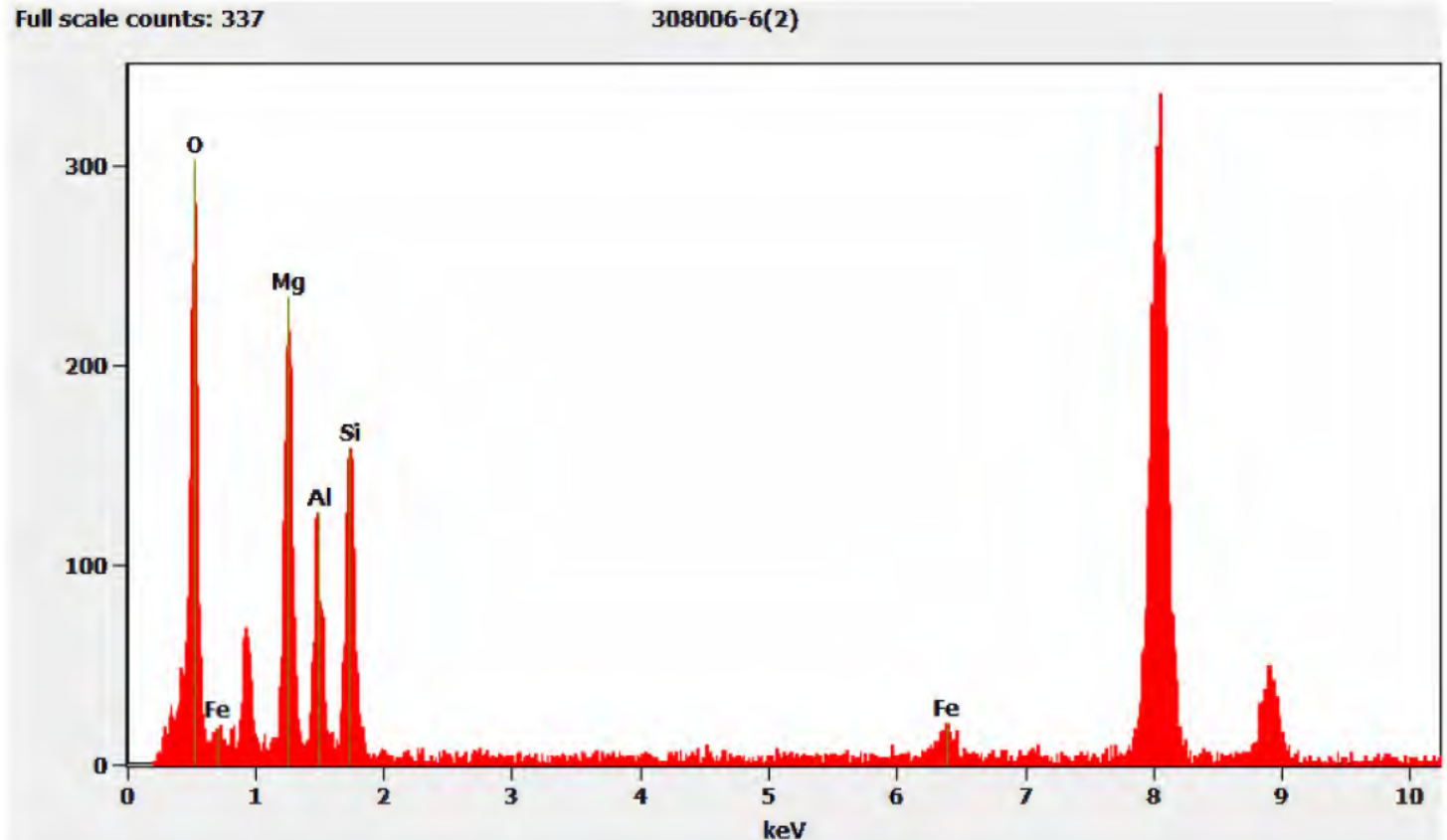
Diffraction Pattern from Mica Particle pictured above



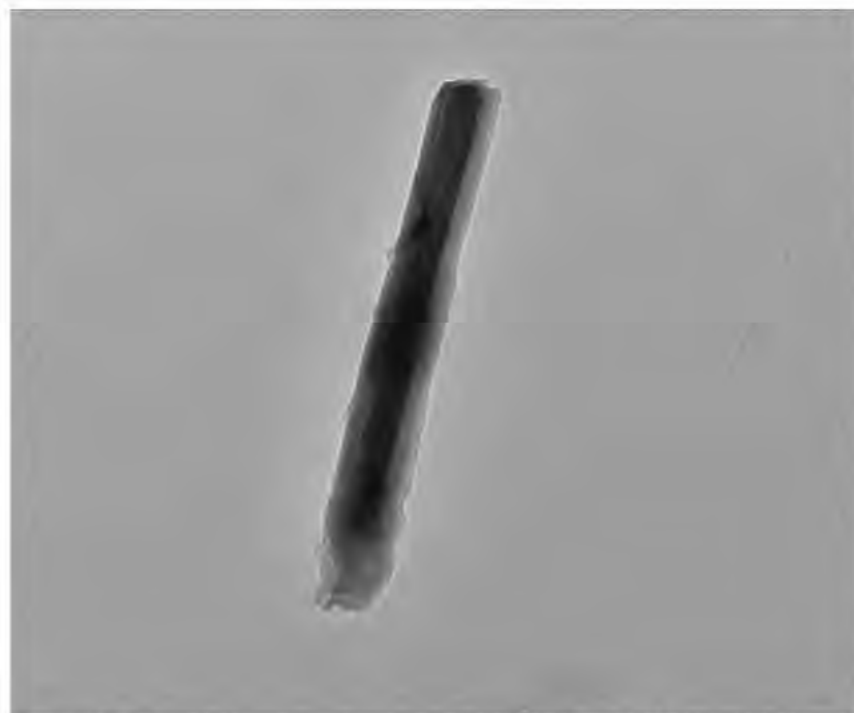
308006 FDA\_056.jpg  
Mica Particle  
17:22 9/3/2019  
TEM Mode: Diffraction  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

100  $(1/\text{\AA})$   
HV=100kV  
Cam Len: 0.2200 m  
AMA Analytical Services, Inc

Chemistry from Mica Particle pictured above



308006-6, Talc Fiber



308006 FDA\_057.jpg  
Talc Fiber  
Cal: 0.734921 nm/pix  
17:27 9/3/2019  
TEM Mode: Imaging  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

200 nm  
HV=100kV  
Direct Mag: 14000 x  
AMA Analytical Services, Inc

*Diffraction Pattern from Talc Fiber pictured above*



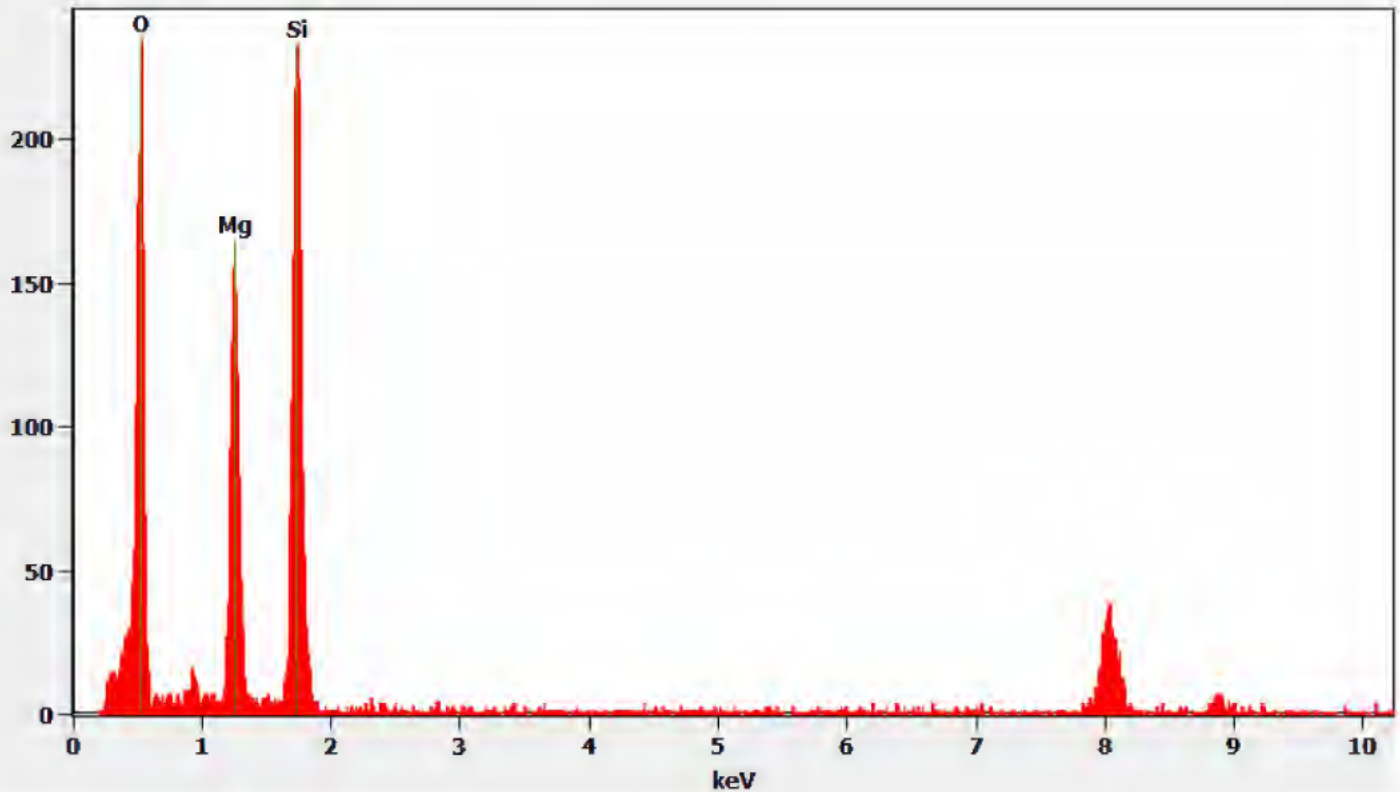
308006 FDA\_058.jpg  
Talc Fiber  
17:28 9/3/2019  
TEM Mode: Diffraction  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

100 (1/Å)  
HV=100kV  
Cam Len: 0.2200 m  
AMA Analytical Services, Inc

*Chemistry from Talc Fiber pictured above*

Full scale counts: 235

308006-6(3)





308006-6, Talc Ribbon



308006 FDA\_059.jpg  
Talc Ribbon  
Cal: 0.001774  $\mu\text{m}/\text{pix}$   
17:37 9/3/2019  
TEM Mode: Imaging  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

500 nm  
HV=100kV  
Direct Mag: 5800 x  
AMA Analytical Services, Inc

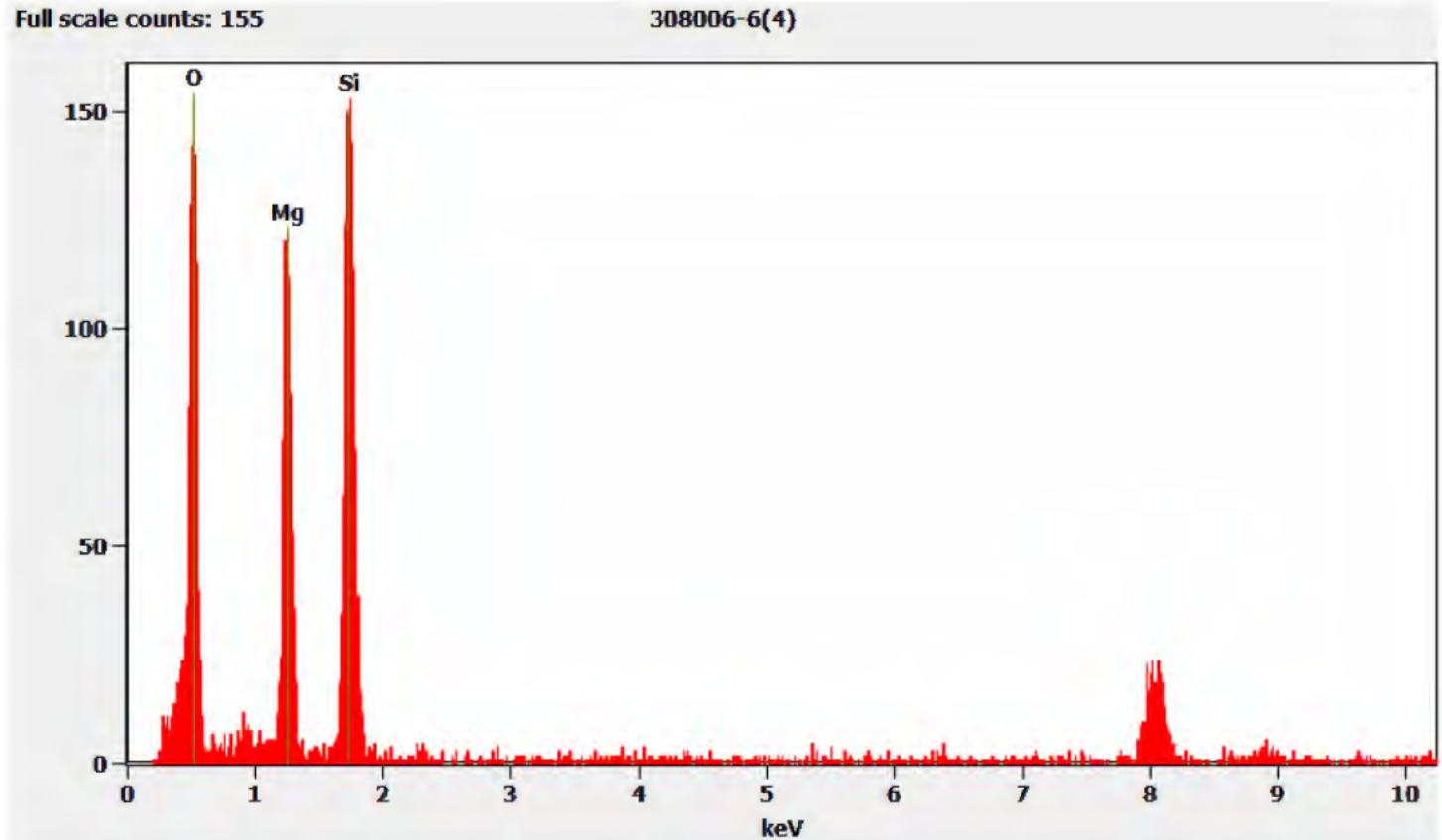
Diffraction Pattern from Talc Ribbon pictured above



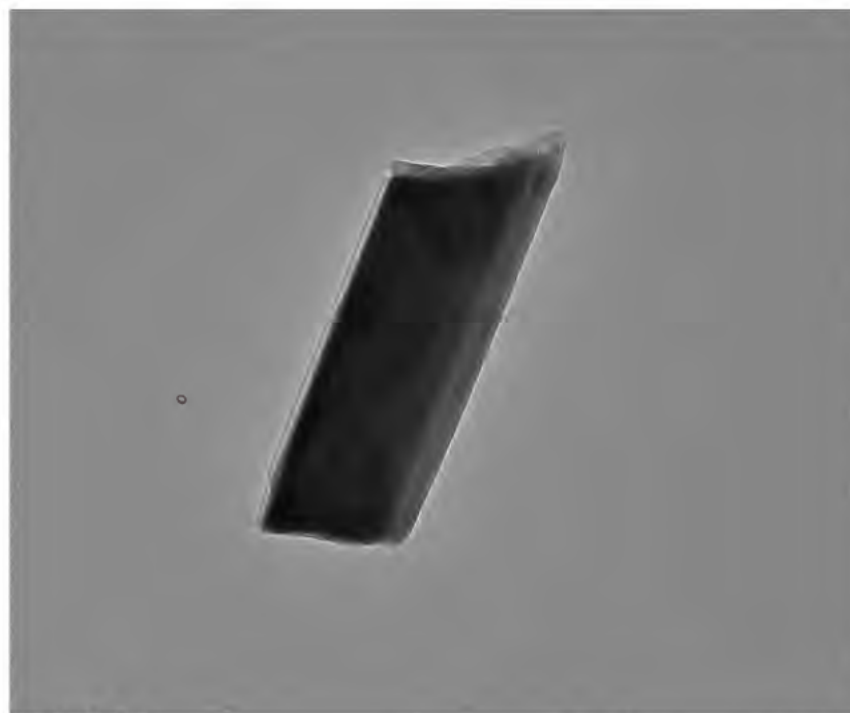
308006 FDA\_060.jpg  
Talc Ribbon  
17:38 9/3/2019  
TEM Mode: Diffraction  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

100  $(1/\text{\AA})$   
HV=100kV  
Cam Len: 0.2200 m  
AMA Analytical Services, Inc

Chemistry from Talc Ribbon pictured above



308006-6, Talc Fiber



308006 FDA\_061.jpg  
Talc Fiber  
Cal: 0.001029  $\mu\text{m}/\text{pix}$   
17:50 9/3/2019  
TEM Mode: Imaging  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast

200 nm  
HV=100kV  
Direct Mag: 10000 x  
AMA Analytical Services, Inc

Diffraction Pattern from Talc Fiber pictured above

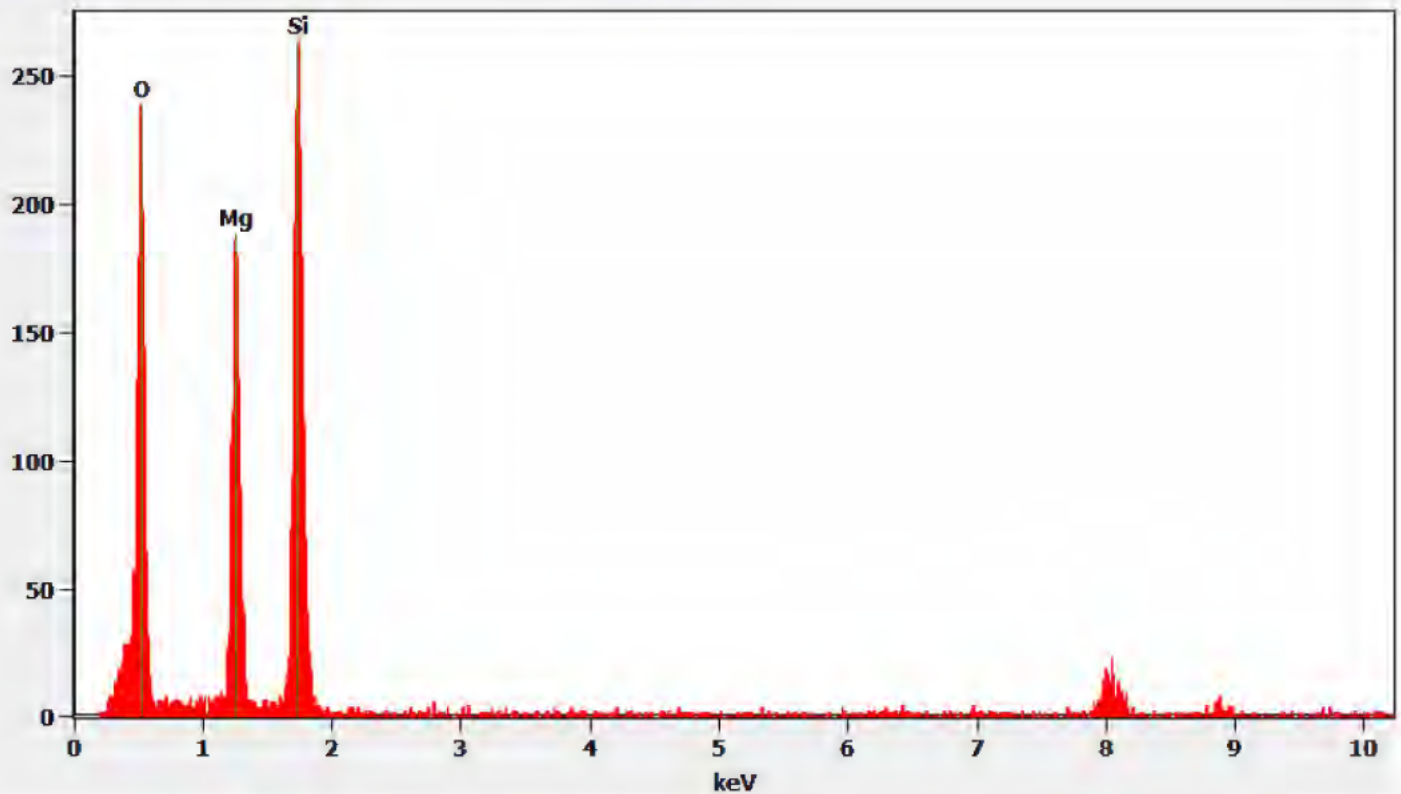


308006 FDA\_062.jpg  
Talc Fiber  
17:51 9/3/2019  
TEM Mode: Diffraction  
Microscopist: MG  
Camera: NANOSPRT5, Exposure: 800 (ms) x 5 drift frames, Gain: 1, Bin: 1  
Gamma: 1.00, No Sharpening, Normal Contrast  
100 (1/Å)  
HV=100kV  
Cam Len: 0.2200 m  
AMA Analytical Services, Inc

Chemistry from Talc Fiber pictured above

Full scale counts: 264

308006-6(5)



**QC Discussion:**

During preparation, three blank control samples and one reference control sample were prepared. These samples were prepared alongside the customer samples. The blank samples were prepared using Sigma-Aldrich Talc Powder, <10 micron, and was analyzed by (b) (6) on September 18, 2019. No asbestos was detected on the blank samples. The reference sample was made from the same Sigma-Aldrich talc powder spiked with 10% Chrysotile. The reference sample was analyzed by (b) (6) on September 18, 2019 and found to be within acceptable limits. Additionally, filter blanks were prepared with each batch of carbon coated filters. Filter blank number EB-54155 was associated with the carbon coating for samples 308006-6, 6A, 6B/D-58. No asbestos was detected on the filter blank sample.

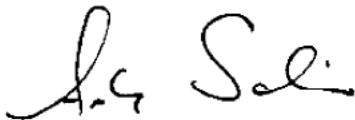
Our laboratory information management system (LIMS) randomly selected samples 308006-2/D-54 and 308006-15/D-67 for additional replicate QC analysis. Separate preparations were made for PLM and TEM analysis. The replicate QC analysis was performed by (b) (6) on September 13, 2019, 2019 for PLM analysis and by (b) (6) on September 18, 2019 for TEM analysis. The QC results matched the original analysis.

**Attachments:**

The following items are attached to this case narrative for your reference:

- 1) Sample Log-In Sheet
- 2) Daily PLM Scope Calibration Log
- 3) Refractive Index Oil Calibration Log
- 4) Daily TEM Scope Calibration Log
- 5) QC Results Summary
- 6) Replicate & Duplicate QC Chart for (b) (6) for samples analyzed between 1/1/2019 and 9/18/2019
- 7) Replicate & Duplicate QC Chart for (b) (6) for samples analyzed between 1/1/2019 and 9/18/2019
- 8) Replicate & Duplicate QC Chart for (b) (6) for samples analyzed between 1/1/2018 and 9/18/2019
- 9) Raw Data Sheets
  - a. Gravimetric Data
  - b. Filtration Worksheets
  - c. PLM Analysis
  - d. TEM Analysis
  - e. QC Samples

I certify that all information contained in this report pertaining to laboratory events, procedures, and protocols is true and accurately describes the handling of this project by AMA Analytical Services, Inc. and its personnel.



Andreas Saldivar  
Laboratory Director

10/11/2019  
Date

